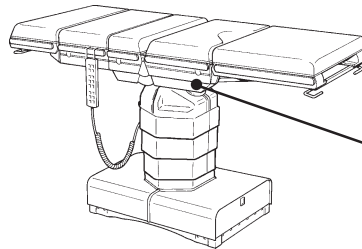


Service Manual

Eschmann After Sales Service Department

The Eschmann After Sales Service Department is staffed and equipped to provide advice and assistance during normal office hours. To avoid delays when making enquires, please quote the Model and Serial Number of your Operation Table which is shown on the Serial Number plate, the location of which is shown below. Please ensure you include all alpha and numeric digits of the Serial Number.



The Serial Number Plate is on the inside of the long trunk section here.

For further information visit www.eschmann.co.uk

All correspondence relating to the after sales service of Eschmann Equipment to be addressed to :

UK Customers

Eschmann Equipment, Peter Road, Lancing, West Sussex BN15 8TJ, England.

Tel: +44 (0) 1903 765040. Fax: +44 (0) 1903 762006.

Overseas Customers

Contact your local distributor. In case of doubt contact Eschmann Equipment.

Patents and Trade marks

The ESCHMANN name and logo are registered trade marks of Eschmann Holdings Limited.

"Eschmann Equipment" is a trading name of Eschmann Holdings Limited.

"RX600" is a trade mark of Eschmann Holdings Limited.

Patents: GB 2260075 & GB 2242624; France 536922 & 450836; US5116032;
Germany P69206378.1 & P69104883.5; Italy 536922 & 450836.
Patents pending in Japan, application numbers 263630/92 & 97990/91.

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The information in this publication was correct at the time of going to print. The Company, however, reserves the right to modify or improve the equipment referred to.

CE If the CE mark is affixed to the product, it indicates compliance with Council Directive 93/42/EEC of 14 June 1993 concerning medical devices.



Keep these Instructions in a safe convenient place for future reference. Read in conjunction with the relevant Publications detailed in the preliminary information section.

1. PRELIMINARY INFORMATION

- 1.1 This Service Manual should be referred to for details of the RX500 Powered Operation Table, REF 80-600-29 (series) and REF 80-600-61 (series) having Serial Number R5BC8J0000 or above.

Related Technical Publications, available on request from Eschmann Equipment :-

Instructions for Use - T-IM28 - RX500 Powered Operation Table
Illustrated Parts List - T-IPL11- RX500 Powered Operation Table

- 1.2 Instruction and Service Manuals should be readily accessible for reference prior to and when operating, cleaning and servicing the Operation Table.

2. TECHNICAL DATA

DIMENSION

Table with standard table-top (Fig. 1) :

Width including sidebars 560mm
Sidebars (31.75 x 6.35)mm
Overall length (with infill section) 2000mm
Minimum table height (without mattresses) 700mm
Maximum table height (without mattresses) 1040mm

SAFETY

The table is built to comply with BS5724 Part 1, BS5724 Part 2 Section 2.22, IEC601-1, IEC601-1-2:1993 and BS6859 Part 1. The mattresses comply with BS2891.

TABLE LOADING

The standard table (Fig. 1) satisfies a static load test in accordance with the requirements of BS5724

MOVEMENTS


Maximum Trendelenburg 35°
Maximum Reverse Trendelenburg 35°
Maximum Lateral Tilt (left and right) 15°
Maximum Extension 220°
Maximum Flexion 130°
Head section adjustment ±45°
Leg section adjustment (-100+10)°


Note: With the table at minimum height, maximum Trendelenburg, and maximum head and leg section movements are reduced due to physical restrictions (i.e. proximity of floor)..

WEIGHT (nominal)


Table with standard table-top (Fig. 1) 300kg


SYMBOLS & SAFETY CLASSIFICATIONS

 Caution Refer to the accompanying documents, the "Instructions for Use".

 or **IPX 4** indicates that the equipment will withstand a moderate quantity of fluid spilled from above.


Safety Category


 Indicates that the equipment is in safety category BF, i.e. it is manufactured to a safety standard which agrees with international regulations for medical electrical equipment, and provides a high degree of protection against electric shock. The symbol also indicates that the equipment will not be damaged by defibrillator discharge.

 Indicates that the equipment is in safety category B, i.e. it is manufactured to a safety standard which agrees with international regulations for medical electrical equipment, and provides a minimum degree of protection against electric shock.

Class 2 Indicates that the built-in battery charger is designed to electrical protection Class 2.

Anaesthetic Proof

 Indicates that the parts of the equipment marked AP are designed for use within a distance of (5 to 25cm) of a part of an enclosed medical gas system. BS5724 Part 1, 1989 refers.

 Indicates that the parts of the equipment marked APG are designed for use within a distance of 5cm of a part of an enclosed medical gas system. BS5724 Part 1, 1989 refers.

WARNING

The head section of this operation table is classified as 'EQUIPMENT not suitable for use in the presence of a flammable anaesthetic mixture with air or with Oxygen or Nitrous Oxide' and is NOT classified as 'Category AP Equipment' or 'Category APG Equipment' when it (the head section) is in its lowest position and the table top is in full Trendelenburg position.

Inspection

The table must be inspected at regular intervals, and if necessary, serviced, to ensure that it complies with all AP and APG requirements relevant to physical deterioration or breakage of electrical components, connections and cable insulation.

2. TECHNICAL DATA

MISCELLANEOUS

Antistatic requirements

The table has an antistatic pathway from the table-top, through an internal resistor to the castors, which are held in contact with the floor at all times.

CAUTION

1. To complete the antistatic pathway, the table must be used on an electrically conductive, or on an antistatic floor.
2. Always use purpose-designed Eschmann mattresses to maintain the antistatic pathway.

Electrical data

System Power

Batteries:

Type Two sealed lead-acid
Output (each) 12V 24Ah

Built-In Battery Charger:

Input 200-240Vac 50/60Hz
Output 27.6Vdc (nom) 3A (max)

System Fuses:

Motor 30A 1.5in. (AGU 30)
Base Control Board: (1) F6.3A 250V 20mm
(1) T2.5A 250V 20mm
(1) T2A 250V 20mm

CAUTION

This equipment contains environmentally hazardous lead-acid batteries. If the batteries fail, or if the equipment is to be disposed of, it is recommended that the batteries are taken to a disposal site designated for the disposal of lead-acid batteries, or that the batteries are collected by an agent who specialises in the collection of lead-acid batteries.

Hydraulic Oil

Type Eschmann RX (Part No. 699408)

3. SAFETY NOTES

Attention to the following points will prolong the life and efficiency of the RX500 Powered Operation Table and will help to avoid the risk of accidents, or damage.

DO:

- ◆ Keep the Instruction Manual close-to-hand.
- ◆ Read the instructions carefully before using table.
- ◆ Check that the head and leg sections are secure, and put the table base in the braked position before use.
- ◆ Disconnect the built-in battery charger from the power supply and switch table off before washing.
- ◆ Read and follow the instructions for cleaning, and for the care of the mattresses.
- ◆ Use the correct mattresses and accessories.
- ◆ Remove table accessories and their clamps (in particular rotary clamps) from sidebars, when they are not being used.
- ◆ Ensure that the table is serviced at regular intervals (every 6 months is the recommended frequency) by Eschmann personnel only, or accredited agents.

DO NOT:

- ◆ Lift the table by its table-top.
- ◆ Push the table over rough surfaces, use a trolley.
- ◆ Drop the table (or individual sections).
- ◆ Put heavy weights on the table sections.
- ◆ Put sharp objects on, or against, mattresses, pads, or the radiographic table-tops.
- ◆ Drop heavy objects onto the radiographic table-tops.
- ◆ Spill oil, ether, or other fluids onto the mattresses or the pads.
- ◆ Pull the table by any of the table-top sections, always push it.
- ◆ Hold or support the leg section by its black radiographic top, as this is a removable item and might come off.

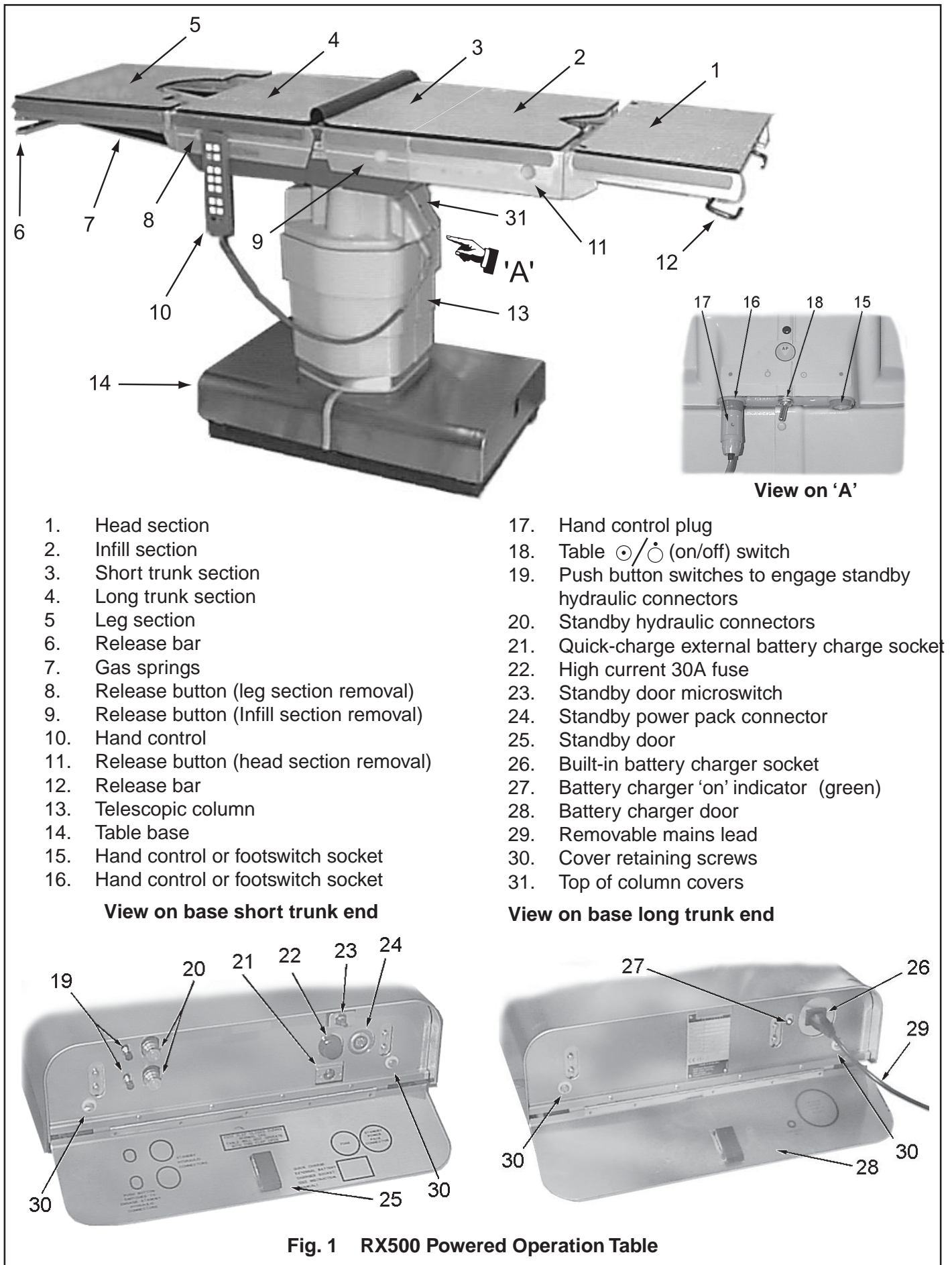
Note: The table cannot be used (under normal circumstances) with table base standby door open.

WARNING

The RX500 Powered Operation Table has been designed to minimise the possibility of accidental electrosurgery burns. Contact with any metal surfaces (e.g. table side bars, or other equipment etc.) can cause burns during electrosurgery and must be avoided.

With the table in (or during transition into) the castor position, the centre of gravity of the patient (normally the perineum) should lie no more than 200mm away from the centre of the column (i.e. no more than the length of the short trunk section). Whenever this is not practical the overhanging weight of the patient and table should be adequately supported (e.g. by at least two able people). Also see Warnings in Instruction for Use and within the text of this publication.

4. INTRODUCTION



4. INTRODUCTION

GENERAL

4.1 This Service Manual contains a technical description and maintenance procedures for the RX500 Powered Operation Table.

4.2 The RX500 Powered Operation Table is a fully mobile table with a five section top comprising short and long trunk sections, an interchangeable infill section and head and leg sections.

4.3 The table enables a full range of surgical and radiographic procedures to be done including: general, urological, gynaecological, cardiothoracic, ophthalmic, ENT and neurosurgical. Certain procedures require the addition of specific accessories, information about which is available on request.

4.4 The RX500 Powered Operation Table is an electro-hydraulically operated, battery powered unit, remotely operated from a touch-button hand control, or a footswitch, both plug into the top of the table column

4.5 Power is provided by two 12V sealed lead-acid batteries in the table base. The 12V batteries are connected in series to give an output voltage of 24V. Trickle charging for the batteries is provided by an inbuilt battery charger, provision is also made for connection of an external battery charger for quick battery charging.

4.6 All table top trunk movements are electrically controlled using either the hand control or, as an optional accessory the four function footswitch (height and Trendelenburg only) which is used by the surgeon during certain procedures.

4.7 The operation table has these main sections:

- ☐ Base.
- ☐ Central column.
- ☐ Long trunk.
- ☐ Short trunk.
- ☐ Interchangeable head, leg and infill sections.

NOTE: Instruction and Service manuals should be readily accessible for reference prior to, and when operating, cleaning, and servicing the table.

ELECTRICAL SYSTEM

NOTE: Electrical/electronic circuit diagrams are provided at the end of this Manual in section 6 (see index page 33).

Main Control Board

4.8 The main control board receives signals from the hand control via an RS485 serial communication link. The board also receives signals from the footswitch, base cover switches, levelling microswitches, tilt switch, opto boards, standby unit socket, door switch and table on/off controls.

4.9 Outputs from the main control board pass to the hand control via an RS485 serial communication link, to the hydraulic solenoids via the top-of-column distribution and solenoid boards, and to the base distribution board, motor on/off control and motor direction control. The main control board is supplied with 24V d.c. from the batteries and generates its own 12V d.c. and 5V d.c. supplies.

4.10 The principal functional areas of the main control board are:

- Input buffering (pull-up and pull-down resistors and capacitors).
- The microcontroller, which uses software to implement table control functions.
- Output buffering (current drivers and level shifters).
- Motor direction drive and on/off control.

Height Opto Board

4.11 The height opto board is fitted at the base of the column in a fixed position relative to the baseplate. It responds to a metal reflector plate which moves up and down with the column chassis and hence with the table top. When the reflector moves in front of the three reflective opto sensors (only two are used) electrical signals are generated to signal to the main control board that the table is at or above 'minimum height', or in the 'castor' position.

4.12 When the reflector plate is in front of reflective opto coupler 01 and at the correct distance from it, a signal is produced which passes via J1 on the opto board and the 10-way ribbon cable to J22 on the main control board.

4.13 When the reflector plate is in front of both reflective opto couplers 01 and 03 signals from both pass to the main control board which stops the table movement at the correct position.

Tilt Opto Board

4.14 The tilt opto board is fitted at the top of the column in a fixed position relative to the yoke. It responds to a metal plate which moves with the yoke and hence with the table top. When the reflector moves in front of the opto sensors electrical signals are generated to signal the main control board that the table is level.

4.15 When the reflector plate moves in front of the opto sensor, a logic signal 0 is produced which passes via J1 on the opto board to the top of column distribution board and then via a 10-way ribbon cable to J2-4 on the main control board.

4.16 When the reflector plate is not in front of the opto sensor, a logic signal 1 is produced which is passed to the main control board as above.

4. INTRODUCTION

Base Distribution Board

4.17 This board receives signals from the main control board for the height (extend) solenoid, the height (contract) solenoid, the pump-isolate (forward) solenoid and the pump-isolate (reverse) solenoid.

4.18 The board also passes signals to the main control board from the cover microswitches .

4.19 Any inductive overswings from the solenoids are blocked by diodes DI to D4. PL7 on the base distribution board is connected via a 14-way ribbon cable to J4 on the main control board.

Top-of-Column Distribution Board

4.20 This board connects to J2 on the main control board via a 34-way retractable ribbon cable which terminates on PL1 of this board. It distributes signals to 10-way hand control/footswitch sockets PL2 and PL3, and to:

- ☐ the tilt switch via PL7
- ☐ the Trendelenburg level position microswitch via PL5
- ☐ the lateral tilt opto board via PL4
- ☐ the break level position microswitch via PL6
- ☐ top-of-column solenoids board via PL8
- ☐ table ON/OFF switch via PL9

Top-of-Column Solenoids Board

4.21 This board receives signals on J7 via a 10-way ribbon cable from J8 on the top-of-column distribution board to drive the top-of-column solenoids via cage clamp connectors J1 to J6. It also blocks inductive overswings from solenoids using diodes D1 to D6.

Power Circuits

4.22 The power source for the table are two 12V, 24Ah sealed lead acid batteries connected in series. A 30A in-line, high current fuse protects the batteries, motor, FET's, relay and interconnections. The fuse is fitted on a panel in the table base.

4.23 Current from the batteries passes via the reversing relay, where it is switched by the FET's, and then passes to the pump motor and returns to the batteries. The 24V d.c. supply is also routed to the hydraulic solenoids and the main control board.

Hand control

4.24 The RX500 hand control communicates with the main control board via an RS485 serial communication link. The hand control contains a microcontroller which receives inputs from the hand control buttons and generates outputs which go to the hand control LED's and the hand control audible warning device. The microcontroller uses software to implement hand control, control functions.

4.25 The hand-control incorporates a 2-digit display that indicates a code if a problem should occur. Such problems could be the result of the user pushing a button in the wrong sequence or at the wrong time or of a system failure (see Table 1 - Fault Diagnosis, Table 2 - Codes for 2-Digit display and Fig. 27)

Footswitch (Optional Accessory)

4.26 The footswitch plugs into either of the two 10-way sockets used by the hand control. It uses the same +5V d.c. and 0V pins, but the signal lines are different from those of the hand control. The footswitch does not use a serial communication link.

4.27 There are four functions on the footswitch:

- ☐ Height up
- ☐ Height down
- ☐ Trendelenburg
- ☐ Reverse Trendelenburg.

4.28 Each of these four functions is associated with two microswitches mounted inside the body of the footswitch, one normally open and the other normally closed. The normally open microswitch for each function is connected on one side to the +5V d.c. line and on the other side to a common 'alarm' line. The normally closed microswitch for each function is connected on one side to the 0V line and on the other side to an individual input line on the main control board. If, for any function of the footswitch, e.g. height up, the normally open microswitch operates and the normally closed microswitch does not, or vice versa, the main control board will recognise a fault and freeze the table. The likelihood of two microswitches failing at the same time is very remote.

Table Base ON/OFF Control

4.29 An 'on/off' toggle switch, fitted on the top of the table column, switches 24V d.c. on the main control board. To isolate the system the 30Amp fuse should be removed.

4. INTRODUCTION

Built-in Battery Charger

4.30 This is a low current output 'trickle' charger which replenishes an average day's table use of the batteries with an overnight charge.

4.31 The mains input comes via the mains lead, which should be fitted with a fused plug. The output of the charger is regulated to provide 27.6V d.c. to the batteries for float charging. This voltage will fall when the batteries are not completely charged and hence are drawing a significant current. The charger has short-circuit and thermal protection. There is an output from the board which supplies current to the batteries, an output to the 'trickle' charger indicator LED and an input from the external charger. Current from either the internal or the external charger is routed to the batteries via the 'trickle' charger board.

External Battery Charger (Optional Accessory)

4.32 The external battery charger plugs into the external battery charger socket in the table base and supplies current via the 'trickle' charger board to the batteries.

Standby System Connections

4.33 An RX Standby Unit (optional accessory) which provides standby hydraulic and electrical services, can be connected to the RX500 table via hydraulic connectors and an electrical socket behind the door on the table base (short trunk section end).

4.34 Next to the hydraulic connectors are two push-buttons which release stored hydraulic pressure when the standby hydraulic connections are made. This is done by energizing the pump forward and reverse solenoids with power from the standby unit.

4.35 To connect the standby unit to the table it is necessary to open the base door. This operates a microswitch which disconnects the main control board solenoid control circuits from the solenoids so that they can be controlled by the standby unit, also the pump motor is hydraulically isolated from the hydraulic solenoids. The electrical signals from the standby socket pass to J1 on the main control board (15-way D-connector).

5. DESCRIPTION

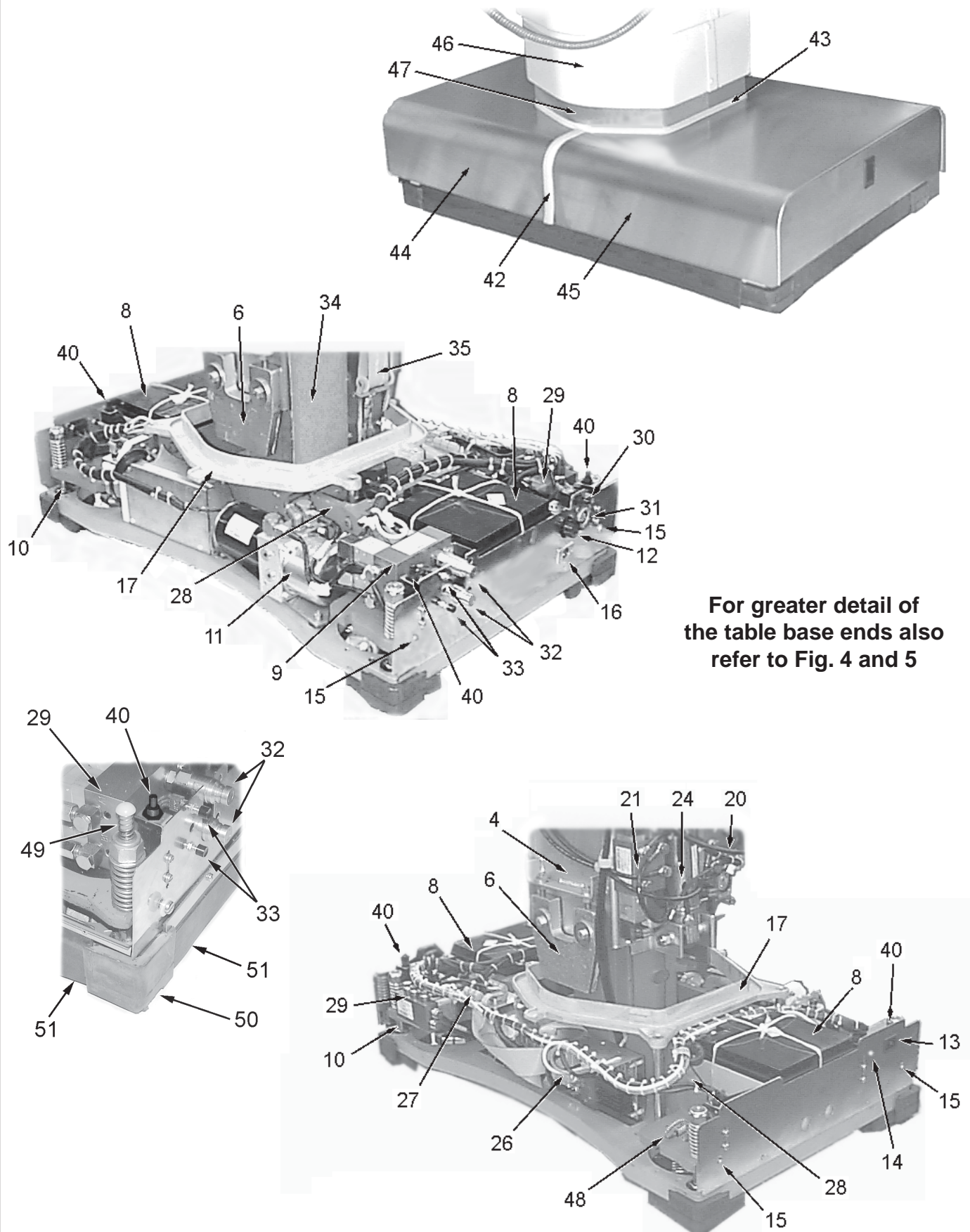


Fig. 2 RX500 Operation Table : Base details, covers on and off

5. DESCRIPTION

Key to Figs 2 and 3

- | | |
|-------------------------------------|--|
| 1. Short trunk assembly | 27. Base distribution PCB |
| 2. Long trunk assembly | 28. Castor frame assembly |
| 3. Lateral tilt cylinder | 29. Manifold block No 2 |
| 4. Wrap around | 30. Door microswitch |
| 5. Trunk assembly plastic covers | 31. Standby power pack connector |
| 6. Wedge | 32. Standby hydraulic connectors |
| 7. Outer column | 33. Push buttons to engage standby
hydraulic connectors |
| 8. Battery | 34. Hydraulic reservoir |
| 9. Manifold block No 1 | 35. Ribbon cable reel assembly |
| 10. Castor plate guide pillar | 36. Top-of-column distribution PCB |
| 11. Hydraulic power unit | 37. Hinge |
| 12. High current fuse, 30A | 38. Lateral tilt opto board |
| 13. Mains socket | 39. Yoke |
| 14. Battery charging LED (green) | 40. Cover microswitch |
| 15. Cover retaining screw location | 41. Table 'on/off' switch |
| 16. External battery charger socket | 42. Base seal |
| 17. Drip gutter | 43. Column seal |
| 18. Opto reflector plate | 44. Long trunk base cover |
| 19. Inner column | 45. Short trunk base cover |
| 20. Manifold block No 4 | 46. Telescopic column cover |
| 21. Manifold block No 3 | 47. Column upstand |
| 22. Upper bezel | 48. Antistatic discharge path resistor |
| 23. Cable from hand control | 49. Base cover spring support |
| 24. Trendelenburg cylinder | 50. Base foot |
| 25. Break cylinders | 51. Base skirt |
| 26. Main control PCB | |

5. DESCRIPTION

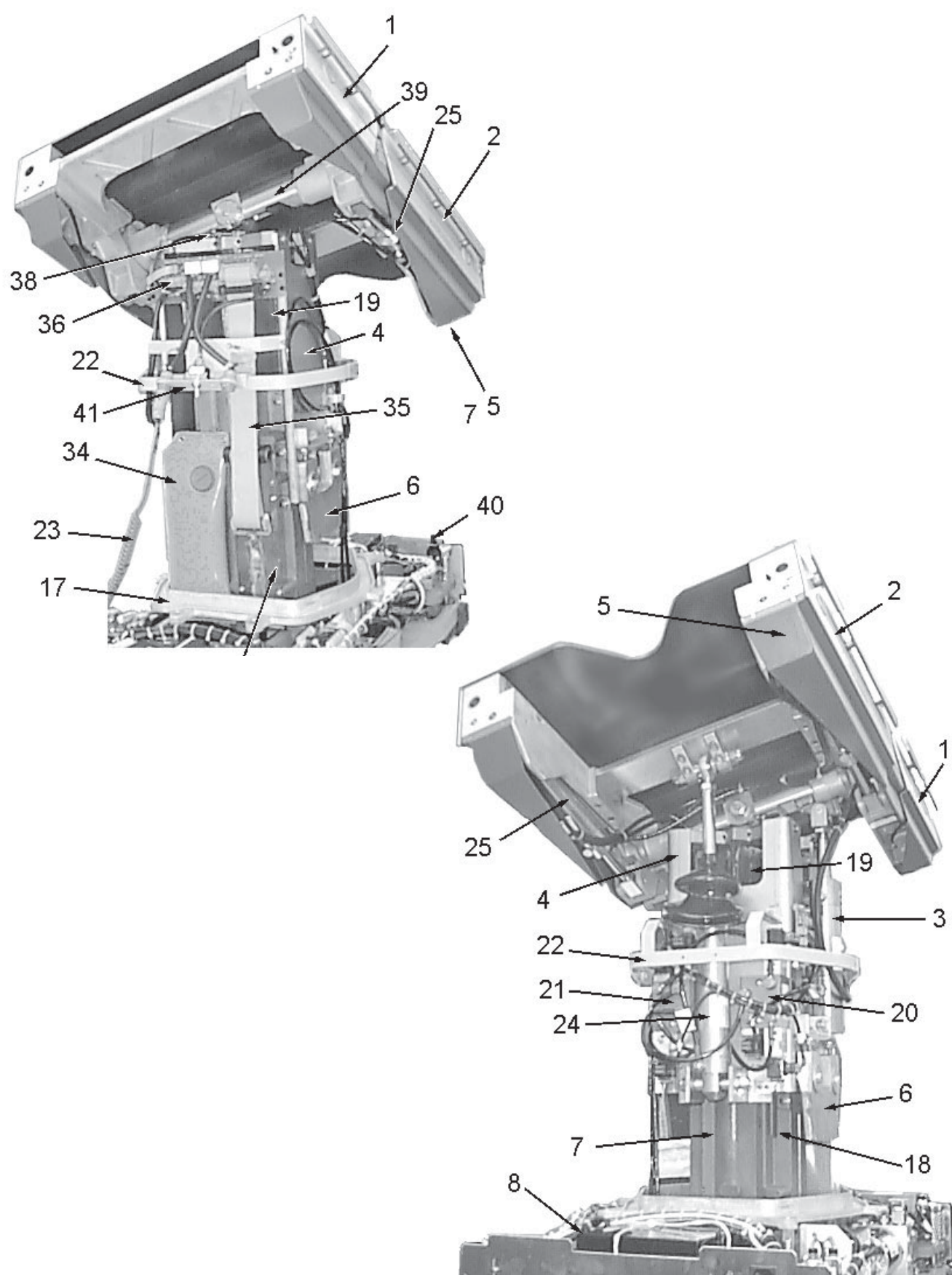
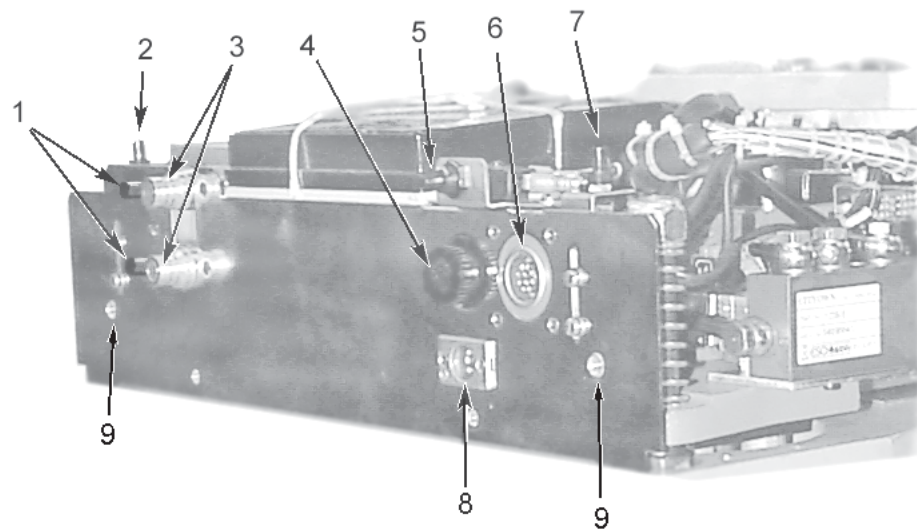


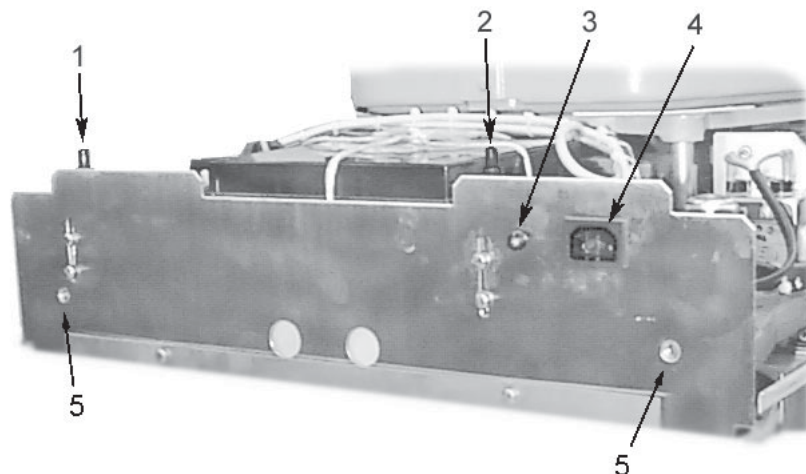
Fig. 3 RX500 Operation Table : Column and trunk section detail

5. DESCRIPTION



- 1 Standby hydraulic push buttons
- 2 Base cover microswitch
- 3 Standby hydraulic connectors
- 4 High current (30A) fuse
- 5 Door Microswitch
- 6 Standby power pack connector
- 7 Base cover microswitch
- 8 External battery charger socket
- 9 Fixing for cover retaining screw

Fig. 4 RX500 Operation Table Base Detail (Short trunk end)



- 1 Base cover microswitch
- 2 Base cover microswitch
- 3 Mains charging LED
- 4 Mains connection socket
- 5 Fixing for cover retaining screw

Fig. 5 RX500 Operation Table Base Detail (Long trunk end)

6. MAINTENANCE

GENERAL

6.1 Maintenance of the RX500 Powered Operation Table falls into the following categories:

- ☐ Cleaning and storage.
- ☐ Adjustments.
- ☐ General care and lubrication.
- ☐ Removal and Installation.
- ☐ Functional checks.
- ☐ Fault diagnosis.
- ☐ Hydraulic system.

CLEANING AND STORAGE

WARNING

Always switch off table at table 'ON/OFF' switch (item 18, Fig. 1) prior to cleaning.

6.2 For cleaning and storage instructions of the table refer to the RX500 Powered Operation Table Instructions for Use (Publication No. T-IM28).

6.3 For cleaning and storage instructions of the table accessories refer to the Accessory Instructions for Use (Publication No. T-IM56).

Note: If the table is to be stored for any length of time the head and leg sections should be fully lowered. This is necessary to ensure that the gas spring seals and pistons are kept lubricated.

GENERAL CARE AND LUBRICATION

6.4 Once a week proceed as follows:

Gas Springs

WARNING

The gas springs are filled with high pressure gas. Do not attempt to open them.

CAUTION

Gas springs MUST NOT be additionally lubricated.

6.5 The gas spring supports for the head and leg sections are sealed units which require no routine maintenance. Malfunction of a gas spring makes it impossible to lock the head or leg sections in position. Seepage of fluid indicates a failing unit.

6.6 If a gas spring is faulty, the complete unit must be renewed; gas springs are non-repairable items (see section 6.42).

Head, Leg and Infill Sections

6.7 Service the head, leg and infill sections as follows:

- i Apply a smear of light machine oil to the guide pins of the head, leg and infill sections, and to the pivot pins of the head and leg sections.

- ii Examine the head, leg, and infill sections for signs of damage, particularly for scoring or bending of the attachment guide pins. On the head and leg sections only, examine the release handles for signs of damage.
- iii Check the guide pin retaining screws for tightness.
- iv On the head and leg sections only, check the hinge pivots, and particularly all pivot pin grub-screws, for security. (Note that the grub screw for the main hinge pivot pin is underneath the radiographic top.)
- v Check the side bars for security.
- vi On the infill section, examine the guide pin locking button devices for damage and ensure that the mechanism which prevents removal of the infill section before any attached section has been removed, functions correctly (refer to sections 6.48 and 6.49). Apply a smear of light machine oil to all moving parts.

Head, Leg & Infill Sections Locking Mechanisms

6.8 Remove the head, leg and infill sections from the table and clean out any collected fluff or other debris from guide pin sockets in the ends of the trunk sections. Spray a little aerosol lubricant into each socket. Check the operation of locking mechanisms when re-attaching the sections (for adjustment refer to section 6.48).

Long and Short Trunk Sections

6.9 Service the long, and short trunk sections as follows:

- i Apply a smear of light machine oil to the pivot pins on the long and short trunk sections.
- ii Examine the guide pin button locking devices for damage (for adjustment refer to section 6.48). Apply a smear of light machine oil to all moving parts.

Radiographic Tops

6.10 Examine the radiographic tops for cracks, chips and scoring. Significant damage will necessitate replacement of the damaged section. Make sure that the radiographic tops are securely attached (not applicable to leg section).

Underside of the Table Base

6.11 To maintain the underside of the table base, it is necessary to tilt the table onto its side as follows:

- i If necessary, remove head, leg and infill sections.
- ii Using the hand control, raise the table to its maximum height and make sure that the long and short trunk sections are level.
- iii Using the hand control, set the table top to the maximum lateral tilt position corresponding to the direction in which the table is to be tilted.

6. MAINTENANCE

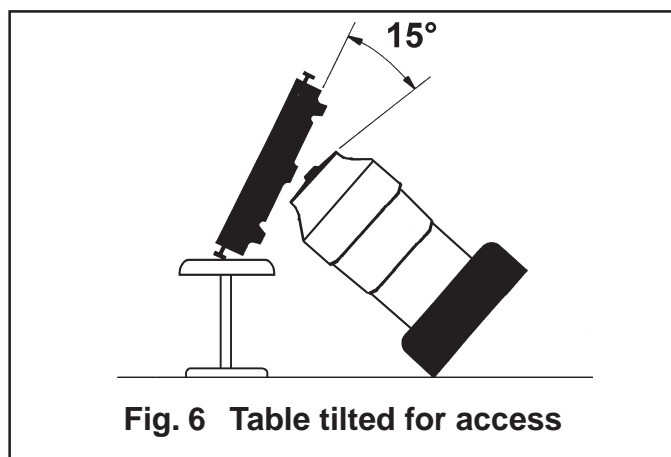


Fig. 6 Table tilted for access

- iv Place an anaesthetist's stool, or a similar strong support, along one side of the table. With two people standing on the same side of the table as the support (one at each end), tilt the table over and gently lower it onto the support, making sure that it rests on the side bars of the long and short trunk sections as shown in Fig. 6.

6.12 With the table tilted, proceed as follows (referring to Fig 7):

- i Examine the five base foot-pads for damage or excessive wear. If necessary, replace the appropriate base foot-pad as described in sections 6.43 & 6.44.
- ii Clean each castor assembly making sure that they are free of dust and debris. Lubricate the bearings of each castor with a light machine oil.
- iii On completion, return the table upright.

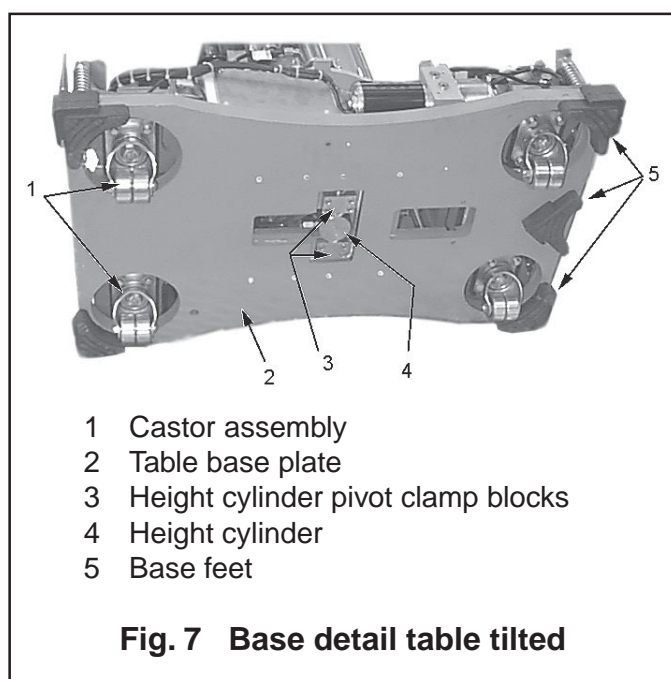


Fig. 7 Base detail table tilted

Access to Fuses

6.13 The mains fuse is found in the table base on the standby panel (item 4, Fig.4). The other three fuses are fitted on the main control PCB (see Fig. 8) in the base of the table underneath the covers. For access see sections 6.24 to remove the covers and 6.25 to refit them.

Hand control

6.14 The factory sealed hand control requires no maintenance. If a fault is suspected in the hand control first test all table functions using a hand control known to be fault free. If a fault is confirmed with the hand control the complete assembly (including lead and plug) should be replaced. (See Fig. 25 for hand control function details).

After Maintenance

6.15 After maintenance on the operation table, always check all functions (section 6.16) and lower the table fully.

FUNCTIONAL CHECKS

General

6.16 The following functional checks should be carried out after maintenance of the operation table, or after rectification of any faults:

- i Check the state of batteries using the hand control, codes 01 and 02 should not be displayed. If they are the table batteries need recharging.
- ii Using the hand control, check that all table movements agree with the Technical Data.
- iii Using the foot control unit (optional extra), check that the table movements are correct for Trendelenburg, Reverse Trendelenburg and Height.
- iv Use hand control to check operation of the 'auto level' function.

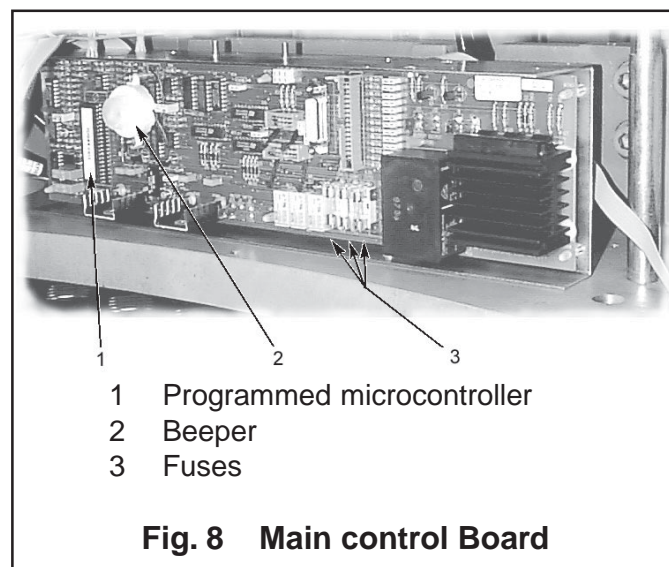


Fig. 8 Main control Board

6. MAINTENANCE

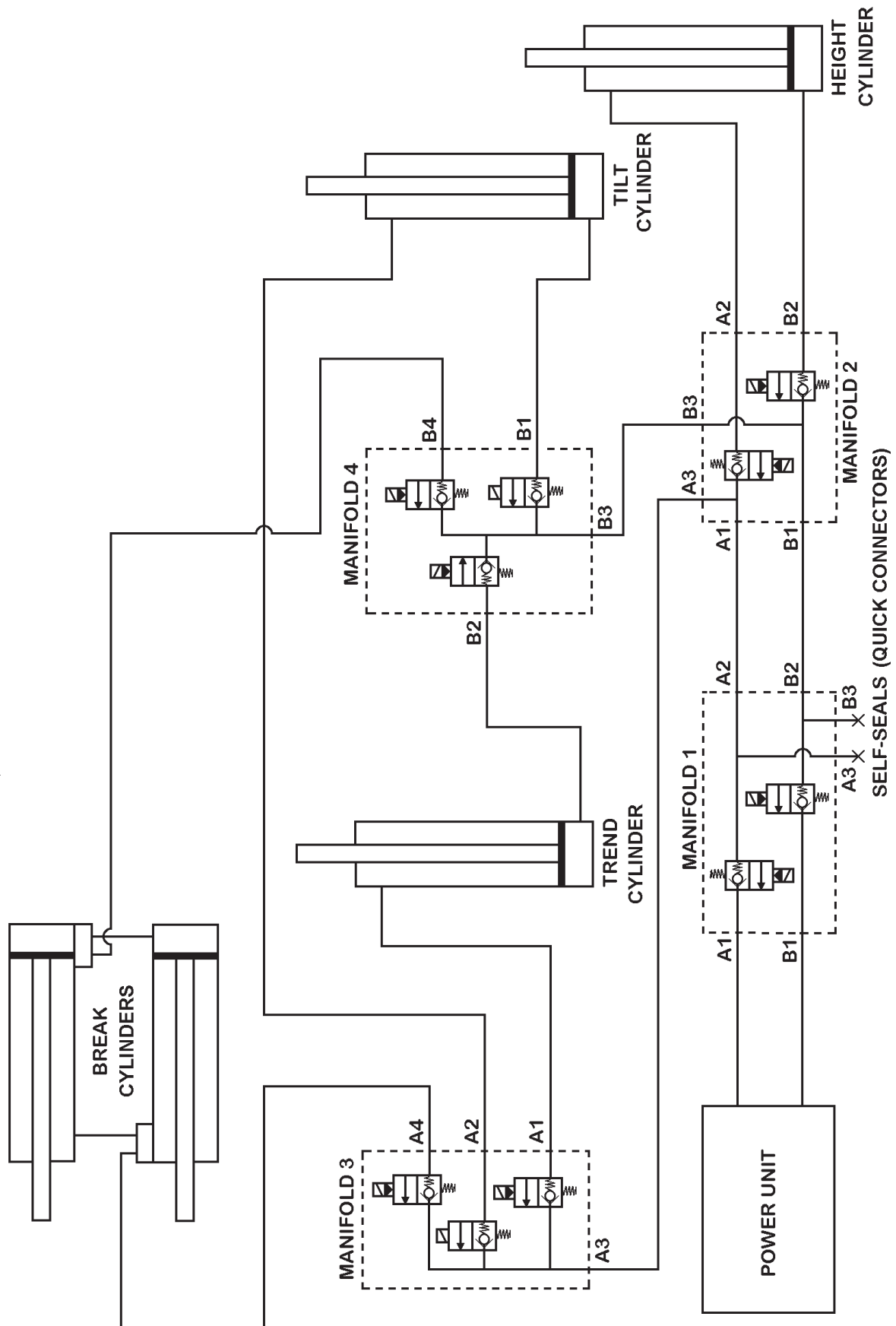
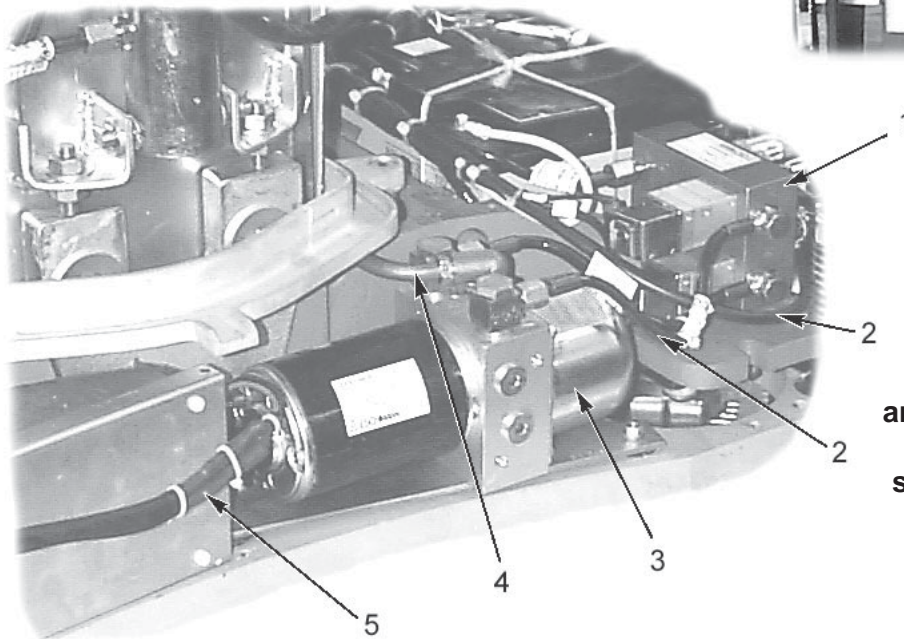
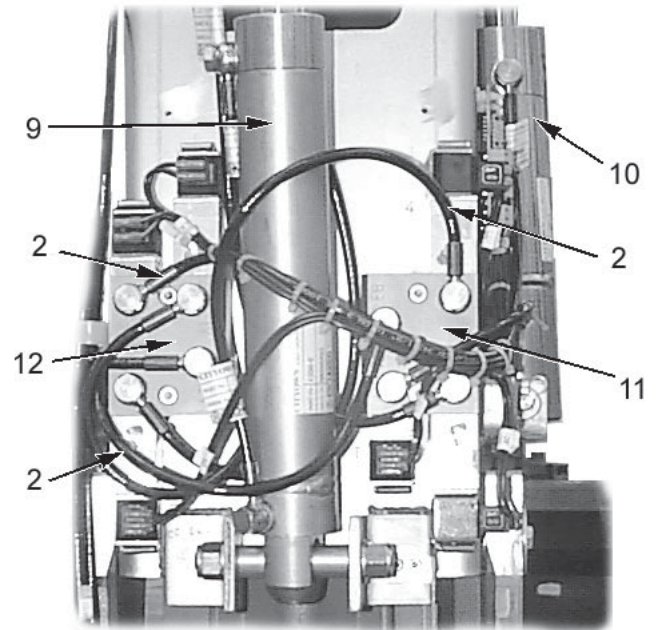


Fig. 9 Hydraulic system - Schematic diagram

6. MAINTENANCE

- 1 Manifold 1
- 2 Hydraulic connections
- 3 Power unit
- 4 Feed from reservoir
- 5 Power unit electrical lead
- 6 Base distribution board
- 7 Base control board
- 8 Manifold 2
- 9 Trendelenburg cylinder
- 10 Tilt cylinder
- 11 Manifold 4
- 12 Manifold 3



For break cylinders see Fig.18
and for height cylinder see Fig.22.
The lateral tilt cylinder is also
shown in greater detail in Fig.19.

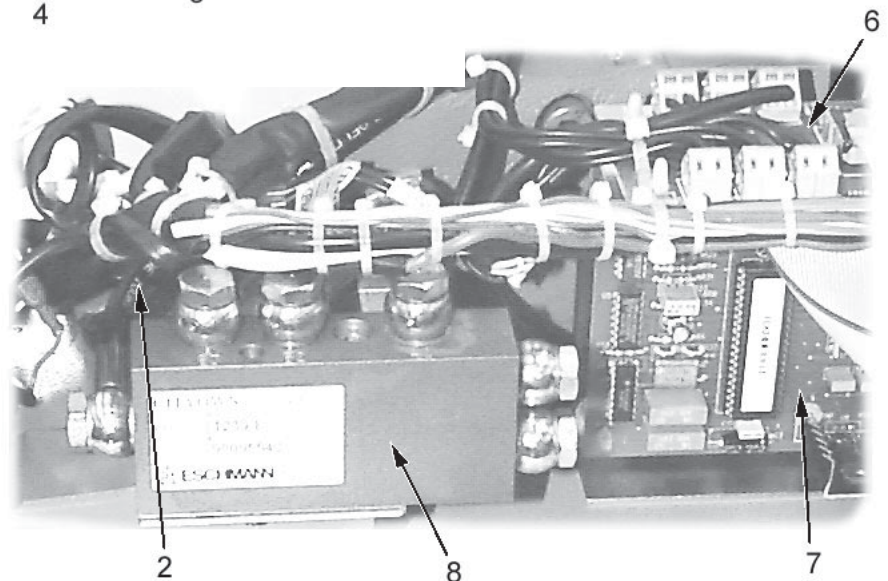


Fig. 10 Hydraulic system - main components

6. MAINTENANCE

HYDRAULIC SYSTEM

CAUTION

Scrupulous cleanliness is essential to prevent contamination of the fluid in the hydraulic system.

Notes:

- 1 Use only Eschmann RX hydraulic oil, Part No.699408, which is obtainable from Eschmann Equipment or their accredited agents. Replace cap on oil container after use.
- 2 When replacing hydraulic components all Banjo fittings must be tightened to a torque setting between 19 and 21 Nm.
- 3 The hydraulic system schematic diagram is shown in Fig. 9 with the main components illustrated in Fig. 10. Individual cylinders are also shown in the 'Removal and Installation' section later in the manual.

General

6.17 If the table cannot be placed into the castor position using the hand control, it may be necessary to manually raise the table base. To raise the table base, proceed as follows:

- i Remove table base covers, see section 6.24.
- ii Locate the Nyloc jacking nut at each corner of the table base (see Fig.24, item 1) and wind the nuts down evenly to raise the table base.
- iii Return Nyloc jacking nuts to the position shown in Fig.24 (i.e. flush with the top of the guide pins) after corrective maintenance and replace covers as section 6.25.

Topping-up the Hydraulic Reservoir

6.18 Top-up the hydraulic reservoir as follows:

- i Set table to an appropriate height and remove base covers as described in section 6.24.
- ii Release the central column cover and remove the upstand as described in section 6.28 and release bezel.
- iii Retract all cylinder rams (see note below) before filling reservoir so that true oil level can be established. Overfilling could cause damage to reservoir.
- iv Remove the filler cap from the hydraulic reservoir and fill the reservoir with Eschmann RX hydraulic oil (see Note 1 above) until oil level is 13 mm below the filler hole of the reservoir.
- v Refit the filler cap on reservoir.
- vi Refit the central column cover and upstand as described in section 6.29.
- vii Refit the base covers as described in section 6.25.

Note: Hydraulic cylinder rams are retracted when the table top is positioned as follows, but care must be taken when moving the table into this position to avoid damage, sections will be very close to the floor :

- Minimum height and onto castors.
- Maximum extension achievable at the minimum height set above.
- Maximum tilt achievable with table at the minimum height and extension set above (tilt table such that the right hand side is lowered when viewed from long trunk end of table).

ADJUSTMENTS

Trendelenburg Microswitch

6.19 To check and adjust the Trendelenburg microswitch (item 3, Fig. 11) proceed as follows:

- i Ensure the table is on a level surface.
- ii Using the hand control, move the table top to the maximum Trendelenburg position.
- iii On the hand control, press the 'auto level' button and wait until the table top stops when level.
- iv Using an inclinometer (on section radiopaque top not the mattress), check the angle of the long trunk section in the horizontal plane.
- v If the angle is more than one degree out in either direction adjust the Trendelenburg microswitch as necessary, by releasing the adjusting screws (2, Fig. 11) and moving the microswitch in the appropriate direction, retighten the adjusting screws.
- vi Repeat steps 'ii-v' until the long trunk section stops level.

Lateral Tilt Opto

6.20 To check and adjust the lateral tilt opto (item 3, Fig. 12) proceed as follows:

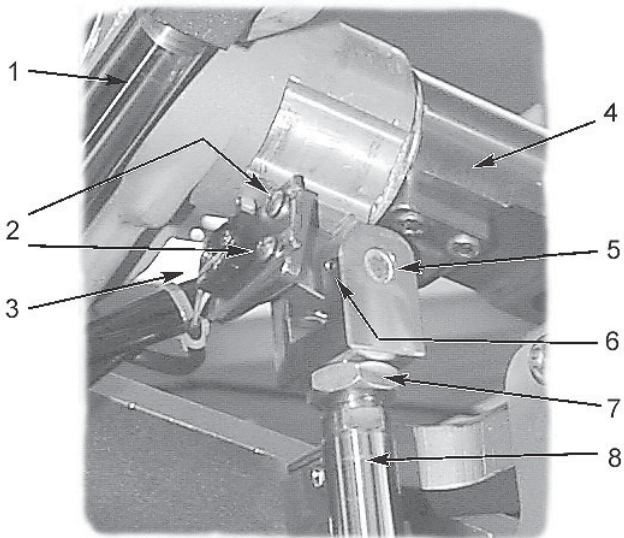
- i Ensure the table is on a level surface.
- ii Using the hand control, tilt the table top to the maximum lateral tilt position (left or right).
- iii On the hand control, press the 'auto level' button and wait until the table top stops when level.
- iv Using an inclinometer (on section radiopaque top not the mattress), check the angle of the table top in the lateral plane.
- v If the angle is more than one degree out in either direction adjust the flag (item 4, Fig. 12) of the lateral tilt opto by releasing the adjusting screws (item 2, Fig. 12) and moving the flag in the appropriate direction, retighten adjusting screws.
- vi Repeat steps 'ii-v' until the table stops level.

6. MAINTENANCE

Break Microswitch

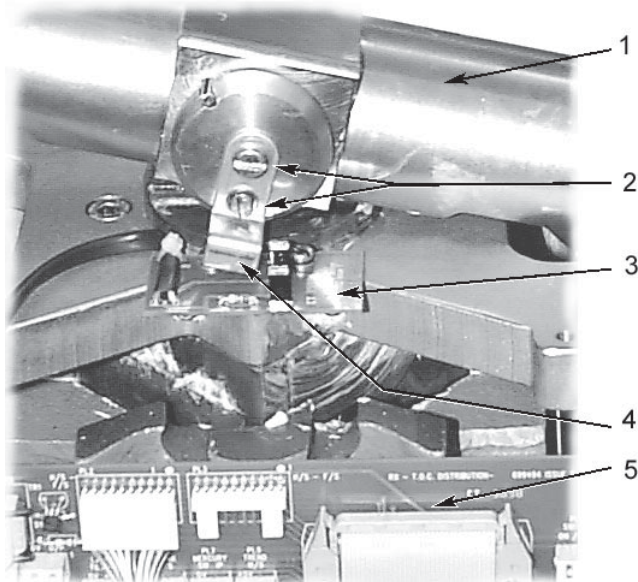
6.21 To check and adjust the break microswitch (item 1, Fig. 13) proceed as follows:

- i Ensure the table is on a level floor.
- ii On the hand control, press the break (extension) button and move the table top to the maximum break (extension) position.
- iii On the hand control, press the 'auto level' button and wait until the table top stops when level.
- iv Using an inclinometer (on section radiopaque top not the mattress), check that the long trunk section is level, if it is not adjust the Trendelenburg microswitch as detailed in section 6.19.
- v Using an inclinometer (on section radiopaque top not the mattress), check the angle of the short trunk section.
- vi If the angle is more than one degree out in either direction adjust the break microswitch by releasing the adjusting screws (items 4, Fig. 13) and moving the microswitch in the appropriate direction, retighten the adjusting screws.
- vii Repeat steps 'ii-vi' until the short trunk section stops level.



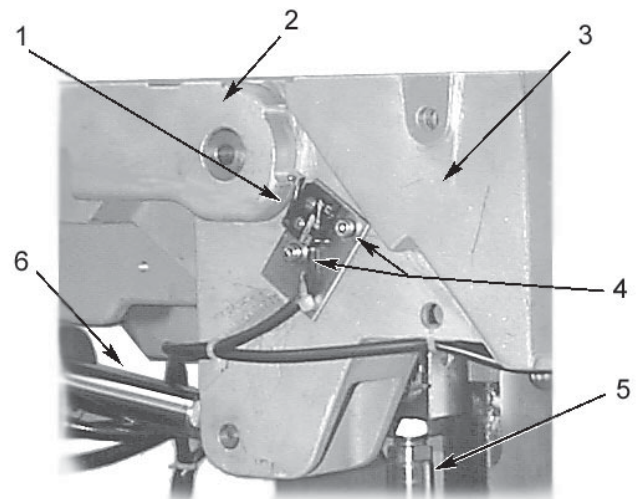
- 1 Break cylinder
- 2 Microswitch adjusting screws
- 3 Trendelenburg microswitch
- 4 Yoke
- 5 Pivot pin
- 6 Pivot pin set screw
- 7 Tilt cylinder ram lock nut
- 8 Tilt cylinder ram

Fig. 11 Trendelenburg microswitch



- 1 Yoke
- 2 Adjusting screws
- 3 Lateral tilt opto board
- 4 Lateral tilt opto flag
- 5 Top of column distribution board

Fig. 12 Lateral tilt opto detail



- 1 Break microswitch
- 2 Long trunk assembly
- 3 Short trunk assembly
- 4 Adjusting screws
- 5 Tilt cylinder ram
- 6 Break cylinder ram

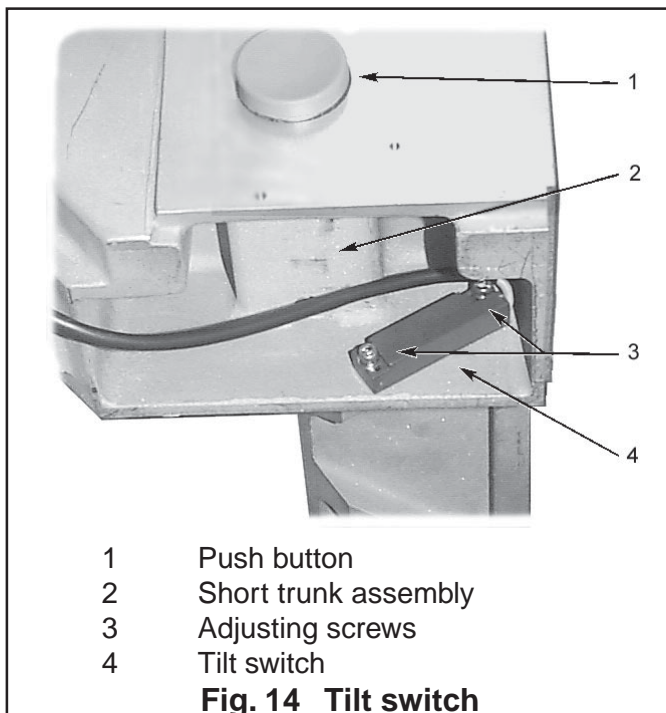
Fig. 13 Break microswitch

6. MAINTENANCE

Tilt Switch

6.22 To adjust the tilt switch (item 4, Fig. 14) proceed as follows:

- i Ensure the table is on a level floor.
- ii On the hand control, press the 'auto level' button and wait until the table top stops when level (check the long and short trunk sections are level in both directions and adjust if required as detailed in sections 6.19 and 6.21).
- iii On the hand control, press patient left orientation button (button 1, Fig. 27).
- iv On the hand control, press the reverse Trendelenburg button (button 4, Fig. 27) and move the table top to the maximum reverse Trendelenburg position.
- v Using an inclinometer (on the radiopaque top not the mattress of the long trunk section), check the angle of the table top. The angle should be 35 degrees.
- vi On the hand control, press the break (extension) button and check for movement of the short trunk section of the table top. If movement occurs, adjust the tilt switch by releasing the adjusting screws (item 3, Fig. 14) and moving the tilt switch in the appropriate direction to stop any movement of the short trunk section with the table top in the reverse Trendelenburg position.
- vii After adjusting the tilt switch repeat actions (iv) (v) and (vi) until there is no movement of the short trunk section in the maximum reverse Trendelenburg position.



REMOVAL AND INSTALLATION

General

6.23 All equipment in the base of the operation table is accessible after the base covers have been removed (see section 6.24). To gain access to equipment located around the central column it is necessary to remove the top-of-column covers (see section 6.26) and release the central column cover and upstand if required (see section 6.28).

Remove Table Base Covers

6.24 To remove table base covers proceed as follows:

- i Open doors at the ends of the table base, see Fig.1.
- ii At the long trunk end of the table base:
 - (a) Remove two screws (item 30, Fig. 1) and shouldered washers and pull the long trunk end base cover (item 44, Fig. 2) from the base.
- iv At the short trunk end of the table base:
 - (a) Remove the two black button covers from the standby hydraulic push buttons (item 19, Fig. 1) by gently pulling them off.
 - (b) Remove two screws (item 30, Fig. 1) and shouldered washers and pull the short trunk end base cover (item 45, Fig. 2) from the base.
- v Remove the two base seals (item 42, Fig. 2). The column seal (item 43, Fig. 2) can remain in place on the upstand unless access is required to the lower column (see section 6.28).

Note: When the hinged cover at the short trunk end of the table is opened, or when the base cover is removed, a microswitch operates to isolate the electrical supply to the table. To operate the table with this cover removed, the microswitch must be taped in the operated position.

Install Table End Base Covers

Note: Before replacing covers check that all cables and hydraulic pipes are secured and that they cannot be pinched, chafed or cut by any moving parts.

6.25 To install table end base covers proceed as follows referring as required to Fig.1 and 2 :

- i Check that all tools and discarded equipment have been removed from inside table base before installing base covers.
- ii To install the short trunk end base cover:
 - (a) Press the two springs at the short trunk end of the base and locate the short trunk base cover in the slide rails along the sides of the base.
 - (b) Push the end cover fully home and secure with two screws and shouldered washers, finally replace the two push button covers.

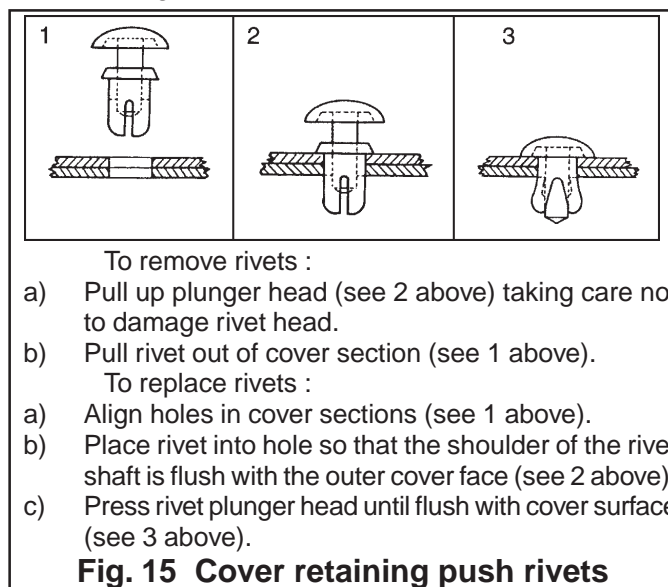
6. MAINTENANCE

- iii To install the long trunk end base cover proceed as follows referring as required to Fig.1 and 2 :
 - (a) Press two springs at the long trunk end of the base and locate the end cover in the slide rails along the sides of the base.
 - (b) Push the end cover onto the base until it is approximately 3 to 4 mm from the short trunk end base cover.
 - (c) Push two base seals into position between the end base covers, and push the long trunk end base cover fully into position. Secure the long trunk base cover using two screws and shouldered washers.
 - (d) If removed replace the column seal onto the upstand, it may be necessary to leave the column seal to contract after initial assembly before butting the edges together, **do not** stretch the seal or trim length.
 - (e) Test cover pressure microswitches.

Remove Top-of-Column Covers

6.26 To remove the two top-of-column covers (item 31, Fig. 1) proceed as follows:

- i Using the hand control or foot switch control unit set the table to full height and full flexion position.
- ii Switch the table 'off', unplug hand control and remove the main 30 Amp fuse from the table base (item 22, Fig. 1).
- iii Remove the four screws and washers on the top of the covers and the two push rivets (see Fig. 15) at the bottom edge of the covers.
- iv Release the two top-of-column covers taking care when removing the covers to ensure that the gaiter for the Trendelenburg cylinder is not damaged.



Install Top-of-Column Covers

Note: Before replacing covers check that all cables and hydraulic pipes are secured and that they cannot be pinched, chaffed or cut by any moving parts.

6.27 Installation of the top-of-column covers is the reverse of the removal procedure described in section 6.26. When installing the top-of-column covers make sure that the gaiter for the Trendelenburg cylinder is correctly installed.

Releasing the telescopic cover and upstand

6.28 To release the telescopic cover and upstand (items 46 and 47, Fig. 2) proceed as follows:

- i Remove the top-of-column covers as described in section 6.26.
- ii Remove all the push rivets (see Fig. 15) holding the telescopic cover to the top bezel to enable the cover to be lowered.
- iii Flex upstand to release cover from its lower edge.
- iv Remove the 4 slotted screws and the base seal (item 42, Fig.2) from the lower edge of the upstand and remove the upstand (if access to the lower column is required).

Refixing the telescopic cover and upstand

Note: Before refitting covers and upstand check that all cables and hydraulic pipes are secured and that they cannot be pinched, chaffed or cut by any moving parts and that the ribbon cable mechanisms are working correctly.

6.29 Refit telescopic cover and upstand (if removed for access to lower column) by the reverse of section 6.28 but note that it may be necessary to leave the base seal to contract after initial assembly to the upstand to allow the edges to butt together (**do not** trim length to fit).

Removing the telescopic cover

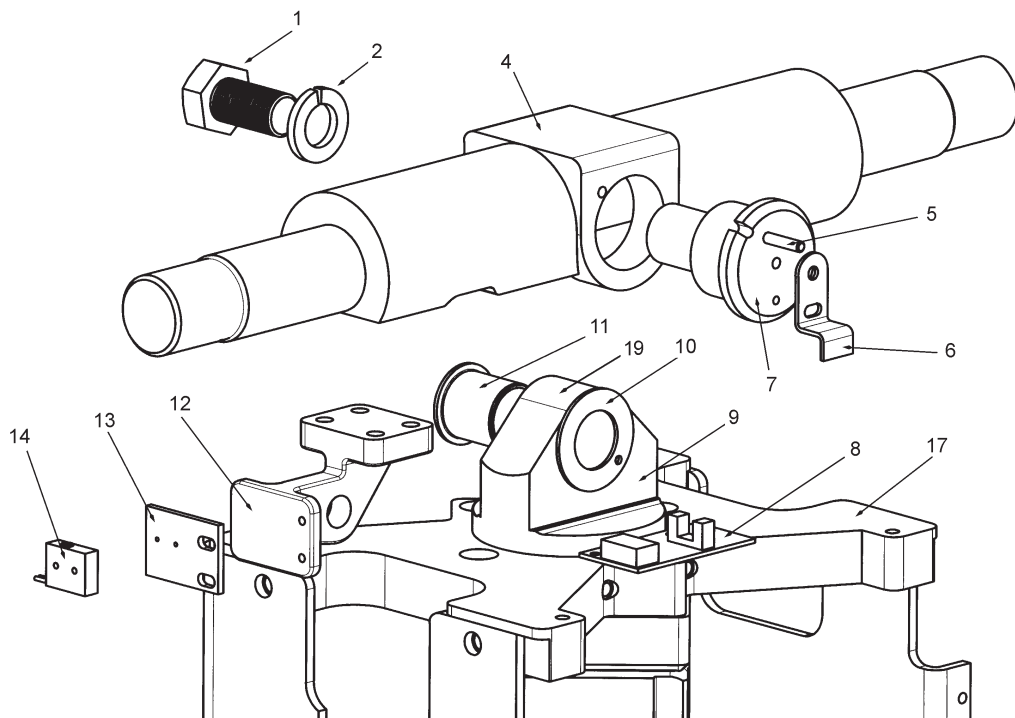
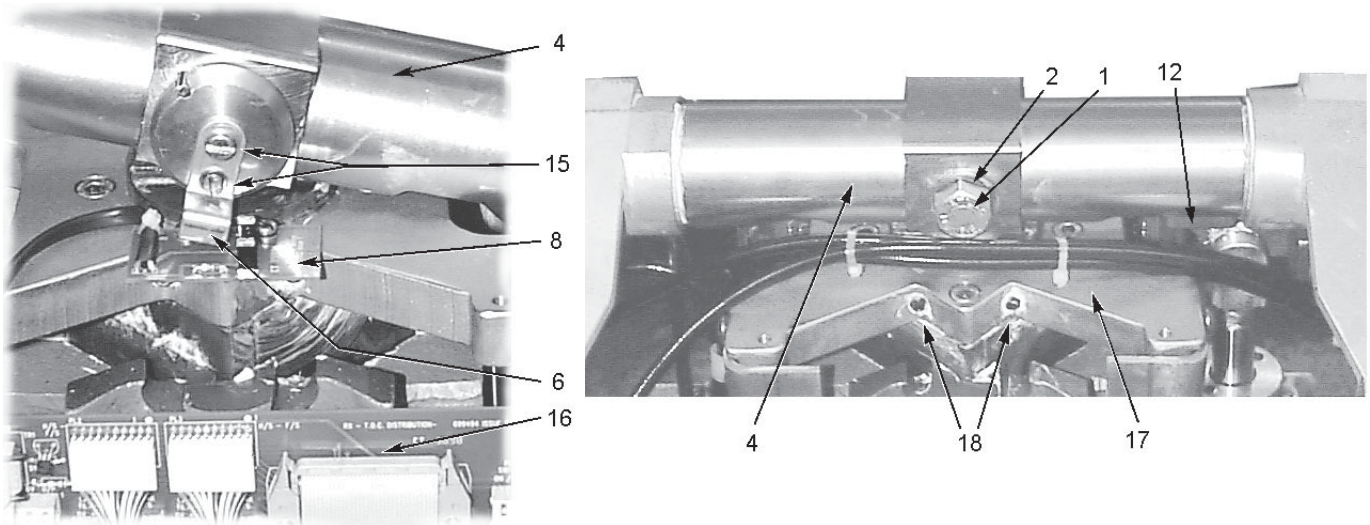
6.30 To remove the telescopic cover (items 46, Fig. 2) proceed as follows:

- i Remove the top-of-column covers as described in section 6.26.
- ii Remove all the push rivets (see Fig. 15) holding the telescopic cover to the top bezel. Then remove the rivets in each pair of telescopic cover section (top pair first then middle and lower) and remove the telescopic cover. Remove the upstand if required as detailed in section 6.28.

Replacing the telescopic cover

Note: Before refitting covers check that all cables and hydraulic pipes are secured and that they cannot be

6. MAINTENANCE



- 1 Yoke pivot bolt
- 2 Spring washer
- 4 Yoke
- 5 Sel-Lok pin
- 6 Tilt opto flag
- 7 Yoke pivot
- 8 Tilt opto board
- 9 Top of column casting
- 10 Washer
- 11 Yoke pivot bush
- 12 Tilt hanger
- 13 Microswitch plate
- 14 Microswitch
- 15 Microswitch adjusting screws
- 16 Top of column distribution board
- 17 Hinge plate
- 18 Height cylinder locking screws
- 19 Column assy. inner

NOTE: Revised new yoke assembly (preferred): New 'Thrust washer' (item 10, Part number 110905) either side of item 19. Thrust washers orientation is important, position black face of both towards head of pivot bolt. Use new 'Washer' (item 2, Part number 110904) and modified bush (no shoulder), with 'Loctite 270' (Part number 110906) on screw thread of item 1.

Fig. 16 Top of column hinge assembly detail

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pinched, chaffed or cut by any moving parts and that the ribbon cable mechanisms are working correctly.

6.31 Refit the telescopic covers (and upstand if removed) in pairs in the correct sequence so they work correctly by the reverse of section 6.30.

Remove Long and Short Trunk Assemblies

6.32 To remove the long and short trunk assemblies proceed as follows:

- i Remove the head, leg, and infill sections.
- ii Remove the top-of-column covers as described in section 6.26.
- iii Remove the black tops, side bars, aluminium covers, plastic covers and hinge covers from the long and short trunk assemblies.
- iv Disconnect the hydraulic hoses (item 3 and 5, Fig. 18) from the two break cylinders (item 7, Fig. 18) and blank off the hydraulic connections and cylinders.
- v Remove two screws (item 3, Fig. 14), shakeproof washers and plain washers which secure the tilt switch (item 4, Fig. 14) to the short trunk assembly and remove the tilt switch.
- vi Remove the lateral tilt opto flag (item 4, Fig. 12) to prevent damage by removing the two adjusting screws (item 2, Fig. 12).
- vii Remove the two screws (item 2, Fig. 11), shakeproof washers and plain washers which secure the Trendelenburg microswitch (item 3, Fig. 11) to the tilt hanger (item 12, Fig. 16) and remove the Trendelenburg microswitch and microswitch plate (item 13 and 14, Fig. 16).

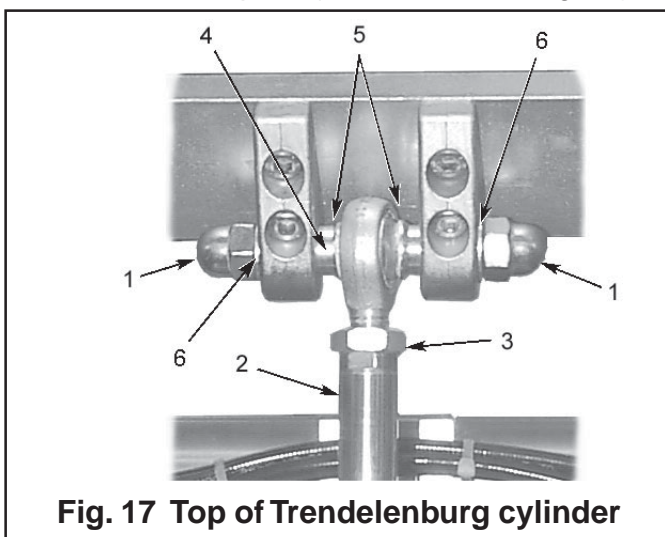


Fig. 17 Top of Trendelenburg cylinder

- viii Remove the two screws (item 4, Fig. 13), shakeproof washers and plain washers which secure the 'break' microswitch (item 1, Fig. 13) to the short trunk and remove the 'break' microswitch.

- ix Remove the ty-wrap straps which secure the hydraulic hoses and the electrical wires to the yoke and move the hydraulic hoses and electrical wires clear of the yoke. Note routing and attachment of hoses and wires.

WARNING

The long and short trunk assemblies are heavy, two people are needed to lift them. The next stages will enable the table top assemblies to move freely in Trendelenburg and then tilt positions and will need to be firmly supported until they have been removed and placed aside.

- x Remove the two dome headed nuts (item 1, Fig. 17) and plain washers from the Trendelenburg cylinder pivot pin on the underside of the long trunk assembly. Remove the pivot pin (item 4, Fig. 17) and disconnect the Trendelenburg cylinder ram from the long trunk assembly. Collect the two spacers (item 5, Fig.17) which are fitted on the pivot pin.
- xi Remove the grub screw (item 5, Fig. 19) which retains the pivot pin for the lateral tilt cylinder (item 1, Fig. 19). Remove the pivot pin (item 6, Fig. 19) and disconnect the clevis (item 10, Fig. 19) on the lateral tilt cylinder ram from the tilt hanger (item 12, Fig. 16 and item 7, Fig. 19), take care not to misplace the bush inside the tilt hanger.
- xii **See note Fig. 16.** Remove the hexagon headed bolt (item 1, Fig 16), and shakeproof washer (item 2, Fig. 16).
- xiii **See note Fig. 16.** The pivot pin (item 7, Fig. 16) together with washer (item 10, Fig.16) which attaches the yoke (item 4, Fig.16) of the long trunk assembly to the hinge, can now be removed if the full weight of the Long and Short trunk assemblies are supported. Remove the long and short trunk assemblies and lay them aside upside down taking care to protect the radiopaque surfaces. Remove the Yoke pivot bush (item 11, Fig. 16) and Sel-Lok pin (item 5, Fig.16) if required from the yoke and inner column respectively.

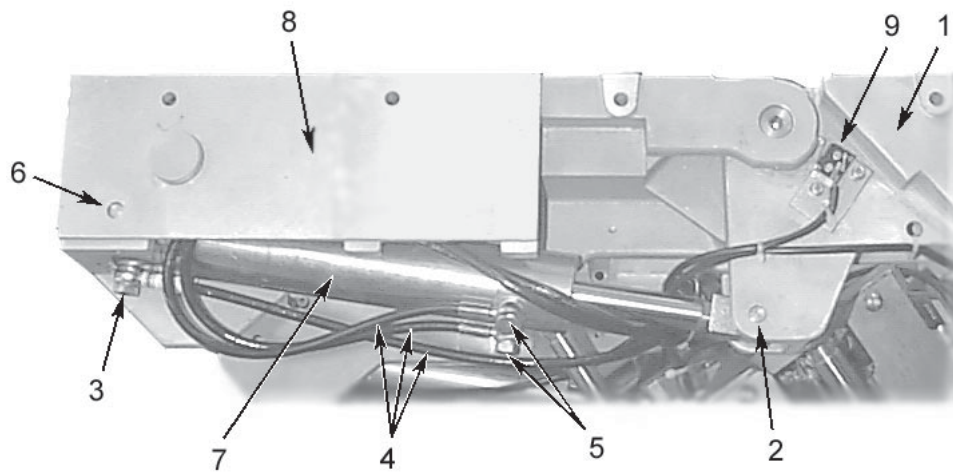
Install Long and Short Trunk Assemblies

Note: Before proceeding read the Caution and notes that precede section 6.17 and the WARNING above in section 6.32.

6.33 To install the long and short trunk assemblies proceed as follows:

Note: Apply Rocol white grease (Part No.110477) to all pivot pins prior to assembly.

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- 1 Short trunk assembly
- 2 Short trunk pivot pin
- 3 Hydraulic connection
- 4 Hydraulic hoses
- 5 Hydraulic connection
- 6 Long trunk pivot pin
- 7 Break cylinder
- 8 Long trunk assembly
- 9 Break microswitch

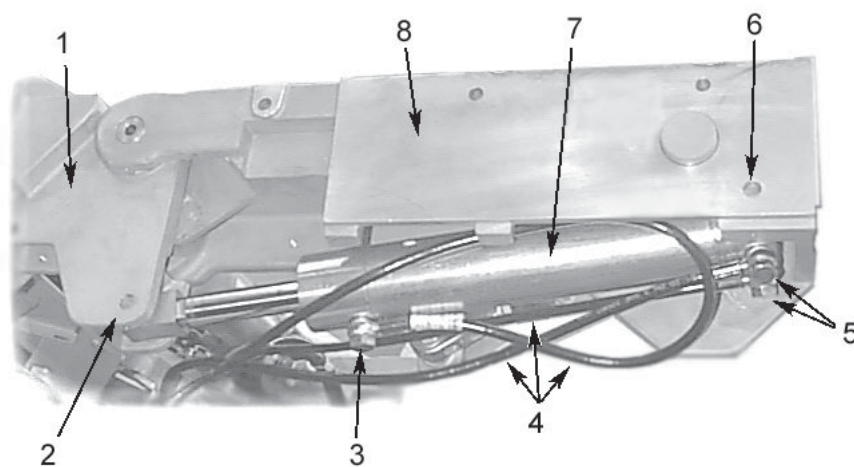
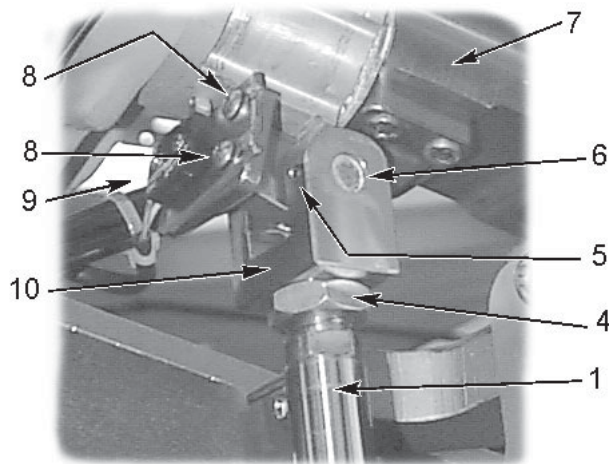


Fig. 18 Break cylinders

6. MAINTENANCE



- 1 Tilt cylinder
- 2 Hydraulic connection
- 3 Top of column solenoid board
- 4 Clevis nut
- 5 Pivot pin grub screw
- 6 Pivot pin
- 7 Tilt hanger
- 8 Microswitch adjusting screws
- 9 Break microswitch
- 10 Clevis
- 11 'R' clip
- 12 Washer
- 13 Pivot pin

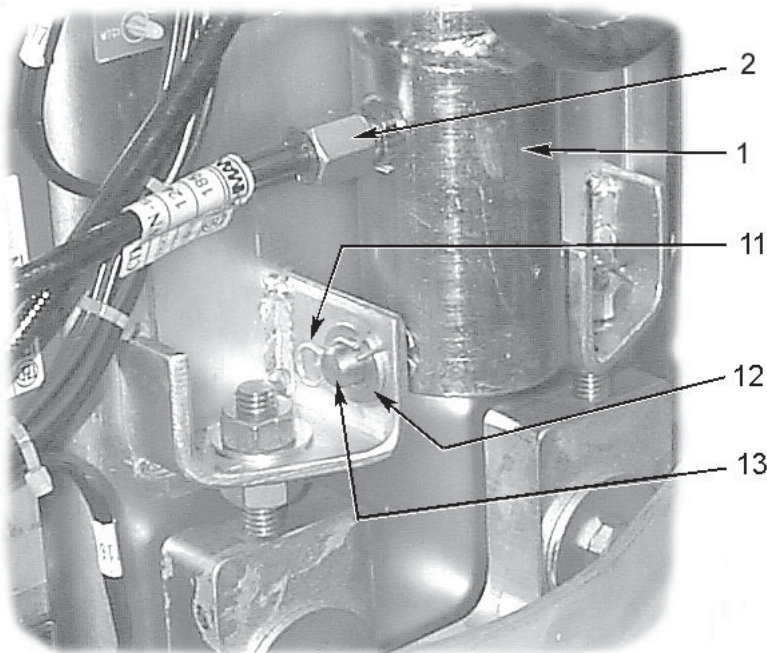
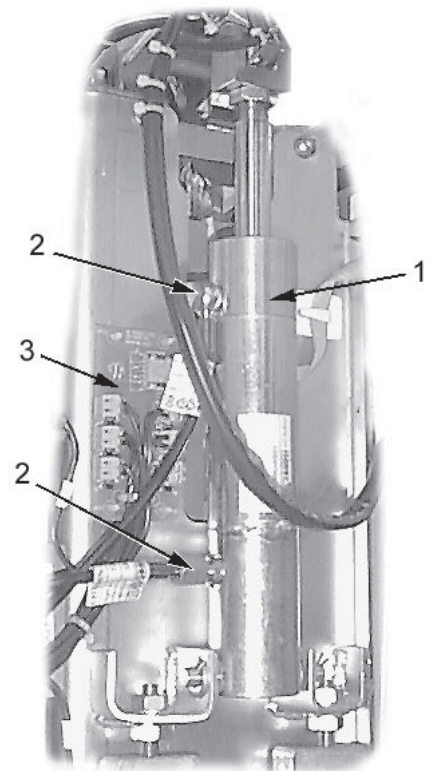


Fig. 19 Lateral tilt cylinder (upper bezel omitted for clarity)

6. MAINTENANCE

- i Apply Rocol white grease (Part No.110477) to the Yoke pivot bush (item 11, Fig. 16) and install into the inner column.
- ii Using at least two people, carefully lift and correctly position the long and short trunk assemblies onto the inner column hinge (item 9, Fig. 16) and replace the pivot pin washer and Sel-Lok pin (items 5,7 and 10, Fig. 16). Hold in place with hexagon headed bolt and shakeproof washer (items 1 and 3, Fig. 16).
- iii Attach the eye-end of the Trendelenburg cylinder to the pivot plates on the cross member of the long trunk assembly as follows (refer to Fig.17 and Fig. 19 as required) :
 - (a) Position the eye-end of the Trendelenburg cylinder between the pivot plates on the cross member.
 - (b) Install pivot pin through one pivot plate on cross member and install one spacer on pivot pin.
 - (c) Push pivot pin through the spacer and eye-end and install remaining spacer on the pivot pin.
 - (d) Push the pivot pin through the second spacer and the second pivot plate.
 - (e) Secure the pivot pin equally between the pivot plates using the two dome nuts and plain washers.
- iv Position the clevis on the tilt cylinder ram around the tilt hanger and install the pivot pin taking care not to dislodge the bush in the tilt hanger. Secure the pivot pin in the lugs of the clevis with pivot pin grub screw.
- v Route the hydraulic hoses and electrical wires over the yoke in the same positions noted in the removal procedure.
- vi Remove the blanks from the break cylinder hydraulic hoses and connect the hydraulic hoses to each break cylinder.
- vii Install the 'break' microswitch on the short trunk assembly, ensuring that two spacers are installed behind the bracket, and secure with two screws, shakeproof washers and plain washers.
- viii Install the Trendelenburg microswitch on the tilt hanger with the microswitch plate and secure with two screws, shakeproof washers and plain washers.
- ix Install the lateral tilt opto flag onto the hinge pivot pin and secure with two screws, shakeproof washers and plain washers.
- x Install the tilt switch on the inside web of the short trunk section, ensuring wires for the switch faces toward the end of the short trunk. Secure the tilt switch with two screws, shakeproof washers and plain washers.
- xi Use ty-wrap straps to secure the hydraulic hoses and the electrical wires.
- xii Top up the hydraulic system reservoir as described in section 6.18.
- xiii Check and adjust the Trendelenburg and break microswitches, lateral tilt opto and tilt switch as described in sections 6.19-6.22.
- xiv Carry out a full functional check of the operation table as described in section 6.16.
- xv Install plastic covers on the hinge pivot points and install the plastic covers, aluminium outer covers, black tops and side bars on the long and short trunk assemblies. Make sure that the plastic covers and the aluminium outer covers do not protrude above the top face of the long and short trunk castings and that they do not restrict push button movement.
- xvi Install top-of-column covers as described in section 6.27.

Remove Break Cylinder

Note: Before proceeding read the Caution and notes that precede section 6.17.

6.34 To remove a break cylinder proceed as follows:

- i At the applicable side of the long trunk assembly, remove the side bar, aluminium outer cover, inner plastic cover and the hinge cover.
- ii Disconnect the three hydraulic hoses (item 4, Fig.18) from the applicable break cylinder (item 7, Fig.18) and blank off the hydraulic connections and cylinder (items 3 and 5, Fig. 18).
- iii At the short trunk end of the break cylinder, remove the grub screw which secures the pivot pin (item 2, Fig. 18) and remove the pivot pin.
- iv At the long trunk end of the break cylinder, remove the grub screw which secures the pivot pin (item 6, Fig. 18) and remove the pivot pin.
- v Remove break cylinder from long trunk assembly.

Install Break Cylinder

6.35 To install a break cylinder proceed as follows (referring as required to Fig. 18) :

- i Position the break cylinder in the long trunk assembly with the cylinder eye-end positioned at the long trunk end.
- ii Apply Rocol white grease (Part No.110477) to the pivot pin for the long trunk end and install the pivot pin in the long trunk and the break cylinder eye-end. Secure the pivot pin to the long trunk with a grub screw.
- iii Apply Rocol white grease (Part No.110477) to the pivot pin for the short trunk end and install

6. MAINTENANCE

the pivot pin in the short trunk and the break cylinder piston eye-end. Secure the pivot pin to the short trunk with a grub screw.

- iv Remove the blanks from the three hydraulic hoses for the break cylinder and connect the hydraulic hoses to the break cylinder.
- v Top up the hydraulic system reservoir as described in section 6.18.
- vi Carry Out a functional check of the operation table as described in section 6.16.
- vii Install the hinge cover, inner plastic cover, aluminium outer cover, and side bar on the applicable side of the long trunk assembly. Make sure that the inner plastic cover and the outer aluminium cover do not protrude above the top face of the long trunk casting and that they do not restrict push button movement.

Remove Lateral Tilt Cylinder

Note: Before proceeding read the Caution and notes that precede section 6.17.

6.36 To remove lateral tilt cylinder (item 1, Fig. 19) proceed as follows:

- i Remove the top-of-column covers as described in section 6.26, and release the telescopic column cover as described in section 6.28.
- ii Disconnect the two hydraulic hoses (item 2, Fig. 19) from the lateral tilt cylinder (item 1, Fig. 19) and blank off the hydraulic connections.
- iii Remove the grub screw (item 5, Fig. 19) which retains the lateral tilt cylinder pivot pin (item 6, Fig. 19) and remove the pivot pin. Disconnect the lateral tilt cylinder from the tilt hanger assembly (take care not to loose the bush in the tilt hanger).
- iv At the column chassis, remove the 'R'-clip (item 11, Fig. 19) from each end of the pivot pin (item 13, Fig. 19). Remove the washers (item 12, Fig. 19) and remove the pivot pin.
- v Remove the lateral tilt cylinder and remove clevis if refitting a new cylinder by releasing nut (item 4 Fig. 19) and unscrewing clevis (item 10, Fig. 19).

Install Lateral Tilt Cylinder

6.37 Installation of the lateral tilt cylinder is the reverse of the removal procedure, however, note the following points on installation and refer to Fig. 19 as required :

- i Apply Rocol white grease (Part No.110477) to the pivot pins prior to installation.
- ii On completion, top-up the hydraulic system reservoir as described in section 6.18, and carry

out a functional test of the operation table as described in section 6.16.

Remove Trendelenburg Cylinder

Note: Before proceeding read the Caution and notes that precede section 6.17.

6.38 To remove the Trendelenburg cylinder (item 2, Fig. 20) proceed as follows:

- i Remove the top-of-column covers as described in section 6.26, and release the central column telescopic cover as described in section 6.28.
- ii Disconnect the two hydraulic hoses from the Trendelenburg cylinder and blank off the hydraulic connections and cylinder (only one connection shown, item 3, Fig. 20, the second one is beneath the bellows).

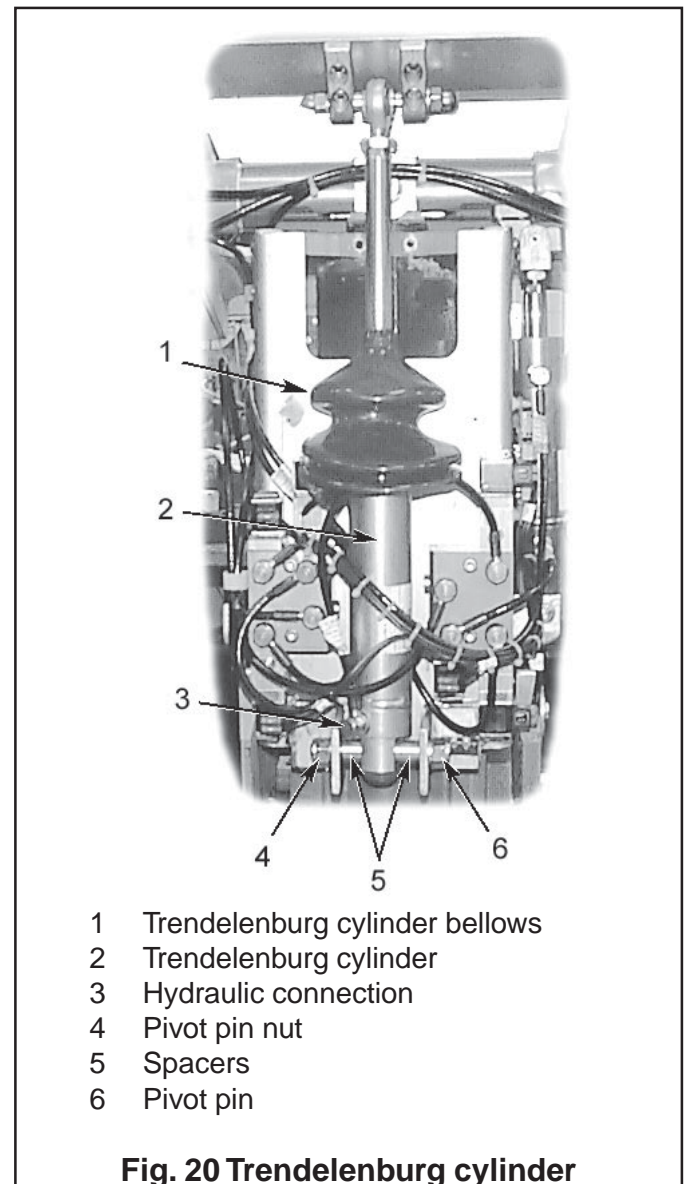


Fig. 20 Trendelenburg cylinder

- iii At the long trunk assembly, remove the two dome headed nuts (item 1, Fig. 17) and plain washers (item 6, Fig. 17) from the Trendelenburg cylinder

6. MAINTENANCE

pivot pin (item 4, Fig. 17) and remove the pivot pin to disconnect the eye-end of the Trendelenburg cylinder from the long trunk assembly (taking care to retain the spacers (item 5, Fig. 17).

- iv At the column chassis, remove nut (item 4, Fig. 20) from each end of Trendelenburg cylinder pivot pin (item 6, Fig. 20) and remove pivot pin (take care to retain spacers item 5, Fig. 20).
- v Remove the Trendelenburg cylinder and remove the eye end from the piston rod.

Install Trendelenburg Cylinder

6.39 Installation of the Trendelenburg cylinder is the reverse of the removal procedure, however, note the following points on installation:

- i Apply Rocol white grease (Part No.110477) to the pivot pins prior to installation.
- ii When connecting Trendelenburg cylinder to long trunk assembly and column chassis ensure two spacers are fitted on each pivot pin.
- iii On completion, top up the hydraulic system reservoir as described section 6.18, and carry out a functional test of the operation table as described in section 6.16.

Remove Height Cylinder

Note: Before proceeding read the Caution and notes that precede section 6.17.

6.40 To remove the height cylinder power table to maximum height and proceed as follows:

- i Remove top-of-column covers (see section 6.26).
- ii **(WARNING The following procedure will need at least three people as the table is heavy. Extreme care must also be taken to avoid injury and damage to the table).** Gain access to the underside of the table base by carefully laying the table onto its side on the floor.

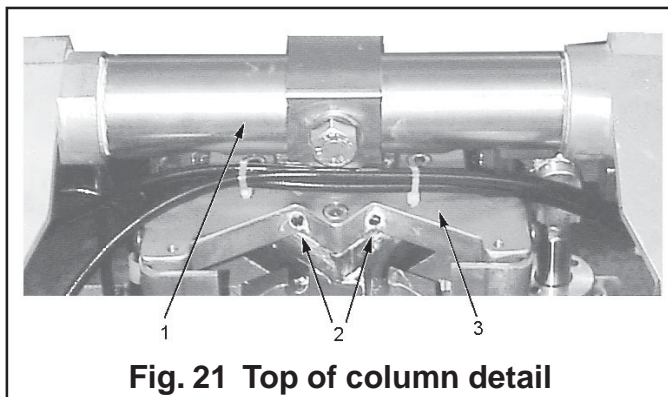


Fig. 21 Top of column detail

- iii Locate and remove the four screws (item 2, Fig. 21) in the hinge plate (item 3, Fig. 21) which secure the rod end of the height cylinder (item 4, Fig. 22).

- iv Remove the eight screws (item 8, Fig.22) and washers and remove the two clamp blocks (item 3, Fig. 22) which attach the pivot pin (item 9, Fig. 22) for the height cylinder to the base of the table.
- v Disconnect the bottom hydraulic hose (Fig. 22, item 6) withdraw the height cylinder from the table column and then reconnect the hose. Power cylinder to minimum height to return most of the hydraulic oil to the reservoir. Disconnect both hydraulic hoses and blank off the hydraulic connections and cylinder.

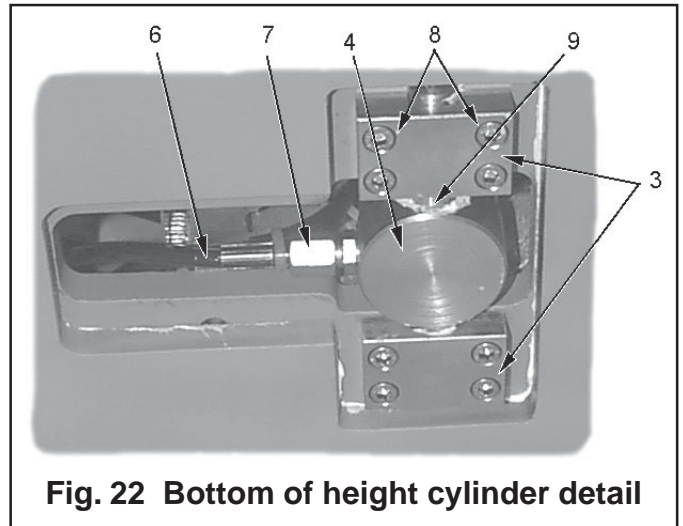


Fig. 22 Bottom of height cylinder detail

- vi Remove the pivot pin from the cylinder end of the height cylinder and remove the rod end from the piston rod.

Install Height Cylinder

6.41 To install the height cylinder proceed as follows referring as required to Fig. 21 and 22 :

- i Apply Loctite 222 (Part No.670650) to the threads of the height cylinder piston rod and install the rod end on the piston rod of the height cylinder.
- ii Remove the blanks from hydraulic hoses and cylinder and connect the hoses to the height cylinder. Power cylinder to maximum height and then disconnect the bottom hose.
- iii Install the height cylinder in the table column with the rod end upper most and reconnect the bottom hose. Make sure that the rod end seats correctly in the hinge plate.
- iv Secure the rod end of the height cylinder to the hinge plate with four set screws (item 2, Fig. 21). It **is important that the socket set screws are below flush of hinge plate when fully tightened.** **Note:** Apply Loctite 222 (Part No.670650) to the threads of the screws prior to installation.
- v Apply Rocol white grease to the pivot pin and install the pivot pin in the cylinder end of the height cylinder.

6. MAINTENANCE

- vi Position the pivot pin on the base of the table and secure it with two clamp blocks. Secure the two clamp blocks with eight screws and washers.
- vii Place the operation table in the upright position.
- viii Top up the hydraulic reservoir as described in section 6.18.
- ix Carry out a functional check of the operation table as described in section 6.16.
- x Install the top-of-column covers as described in section 6.27.

Gas Spring Replacement

6.42 To remove and replace a head or leg section gas spring proceed as follows :

Note: In Fig. 23 a head section is shown, the arrangement is basically the same for a leg section also see WARNINGS and Caution in section 6.4.

- i Release gas piston nut (1, Fig.23) from link (4, Fig. 23)
- ii Release grub screw (2, Fig. 23) retaining pivot pin (3, Fig. 23) and remove the pivot pin by inserting a screw into the end of the pivot pin to aid removal.
- iii Unscrew the gas spring piston from the link.
- iv Replace a new gas spring by the reverse of above (adjusting it as below) and lubricate the pivot pin with grease.

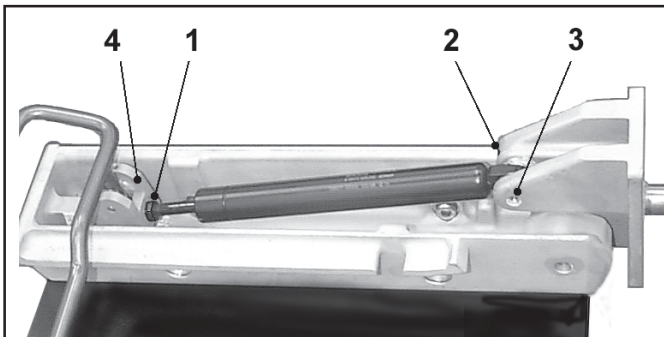


Fig. 23 Gas spring detail

- v Adjust the gas spring by screwing the piston into the link until the actuator nipple has 0.5-1.0mm clearance with the release bar and ensure that both gas springs of the section are adjusted to match. Finally tighten the piston nut (1, Fig. 23) onto the link.

Remove Batteries

6.43 To remove the batteries proceed as follows:

- i Remove the base covers as described in section 6.24.
- ii Remove the 30A fuse (item 4, Fig.4).
- iii Disconnect the positive (+) and negative (-) leads from each battery.

- iv Using the cord provided, lift the batteries from base.

Install Batteries

6.45 Installation of the batteries is the reverse of the removal procedure, then replace covers as section 6.25.

Remove the Base Feet

6.46 To remove the base feet, proceed as follows:

- i With the table in the castor position remove the base covers as described in section 6.24.
- ii Remove each of the four corner feet as follows:
 - (a) Turn the Nyloc nut (1, Fig.24) down sufficiently to add and lock another nut onto it.
 - (b) Loosen the nut (4, Fig.24) securing the corner guide pin (2, Fig.24) to the base.
 - (c) Loosen and remove the guide pin from the foot (5, Fig.24).
 - (d) Remove the foot from the base by pulling it away from the base with the two Sel-Lok pins.
- iii To remove the fifth foot, proceed as follows:
 - (a) Remove the 30A fuse (item 4, Fig.4).
 - (b) Remove the battery at the short trunk end of the base (see section 6.43).
 - (c) Remove one socket head countersunk screw with spring washer and remove the foot from the base with the two Sel-Lok pins.

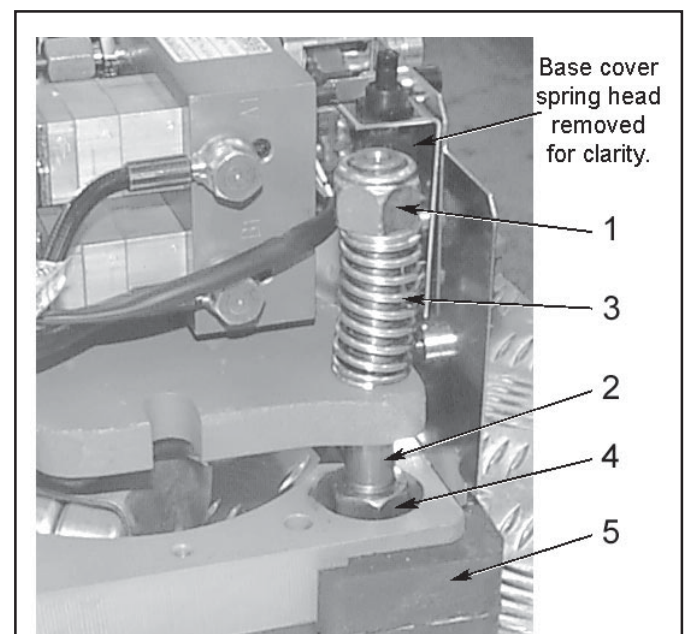


Fig. 24 Base feet detail

6. MAINTENANCE

Install the Base Feet

6.47 To install the base feet, proceed as follows:

- i Install each of the four corner feet as follows:
 - (a) Fit two new Sel-Lok pins into the foot, ensuring they are pressed to the bottom of the blind holes.
 - (b) Position the foot on the base plate and secure it using corner guide pin, nut and spring washer (spring 3, Fig.24 should still be on guide pin).
 - (c) Remove the lock nut placed at stage (i) section 6.46 and turn Nyloc nut (item 1, Fig. 24) up until it is flush with the top of the guide pin (item 2, Fig. 24) as shown in Fig. 24.
- ii Install the fifth foot as follows:
 - (a) Fit two new Sel-Lok pins into the foot, ensuring they are pressed to the bottom of the blind holes.
 - (b) Position the fifth foot on the base plate and secure it using the socket head countersunk screw and spring washer.
 - (c) Install the battery at the short trunk end of the table base and replace the 30A fuse.
- iii Install the base covers as described in section 6.25.

Infill interlocking mechanism replacement

6.48 To remove and replace the interlocking mechanism in the infill section, refer to Fig. 25 and proceed as follows:

- i Release each interlock rod (4 and 6) from the connecting block (2) by releasing the grub screws in connecting block (2).
- ii Replace any worn parts and reassemble as shown in Fig. 25, with 5mm of rod 6 and 4mm of rod 4, protruding through the connecting block (2) and springs (3) correctly positioned. Finally adjust the mechanism by inserting tool No.1752 into the guide pin hole and pushing fully home, rod (4) should protrude 6.5mm out of the infill casting.
- iii Lubricate all moving parts with a smear of light machine oil and check operation, (i.e. a head or leg section guide pin (1) should operate the mechanism as shown in Fig.25).

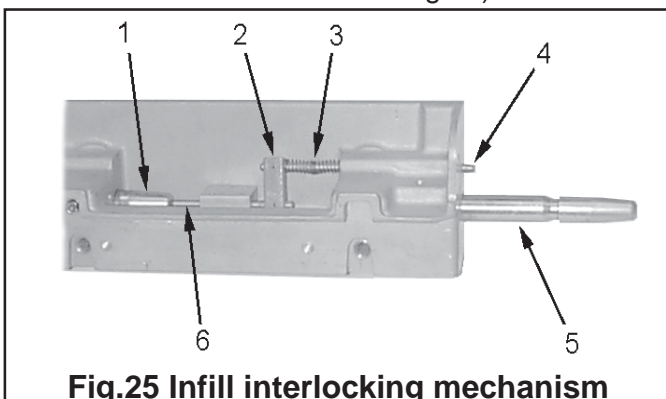


Fig.25 Infill interlocking mechanism

Push button replacement and adjustment

6.48 To replace the push-button catches remove any attached table section, refer to Fig.26 and proceed as follows:

- i Remove screw (1) to release the push-button. The right hand push-button operates in conjunction with spring loaded plungers (2) which hold the push-button 'in' when pressed with a section in position. To access to these plungers place a screwdriver in catch retainer (3) and remove plungers (2) with spring.

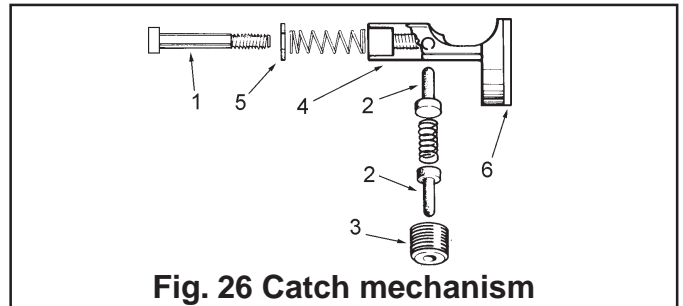


Fig. 26 Catch mechanism

- ii If the plunger has become damaged or distorted it should be replaced. If the latch has scored the guide pin of head, leg or infill section the complete push-button and guide pin should be replaced.
- iii Reassemble using new parts as required with Loctite on screw (1) and ensure free movement of all parts, lubricating with light machine oil. It is advised that setting tool number T1612 Part No. 759579 is used when finally adjusting push buttons as follows:
 - a) Push setting tool T1612 into guide pin hole up to the edge of the groove and tighten screw (1) until the washer (5) just touches the side of the casting with the setting tool in place.
 - b) Check the setting of the push button by sliding the tool in and out slowly, it should be possible to feel the push button rubbing on the gauge by resting a finger lightly on the button and a slight jump of the button will be felt when the gauge contacts the button.

Removal and installation of hydraulic components

Note: Before proceeding read the Caution and notes that precede section 6.17.

6.50 The hydraulic power unit is replaced as a complete unit and is a self-evident procedure. The manifold and solenoid valve assemblies should be treated similarly. Hydraulic cylinder replacement is covered individually in sections 6.34 to 6.41. Check all table functions after removal and installation, as detailed in section 6.16.

Removal and installation of electrical components

6.51 All PCBs are non-repairable items and should be replaced as complete units. Replacement of all electrical components is a self evident procedure.

6. MAINTENANCE

FAULT DIAGNOSIS

6.52 The fault diagnosis table that follows lists possible causes of faults and/or conditions that can be rectified during use, or maintenance procedures, depending on the remedy given. Electrical/electronic faults should be traced and rectified in conjunction with the relevant circuit diagrams supplied (see Index on page 33). For any faults, listed or not, which cannot be resolved, please contact the Eschmann After Sales Service Department; for details see inside front cover.

TABLE 1 - FAULT DIAGNOSIS

Fault/Condition	Possible Cause	Remedy
1 Code 01 is displayed.	Battery voltage low, i.e. below 18V d.c. on load.	Charge batteries using internal battery charger. Engineer to check condition of batteries and replace if necessary.
2 Code 02 is displayed.	Battery voltage critically low, i.e. less than 18V d.c. off load.	Charge batteries using external battery charger. Engineer to check condition of batteries and replace if necessary.
Note: Low battery detection does not cause the table to stop moving. The warnings can only be cleared by switching the table 'off' at the base and then 'on' again. Code 02 stops all table movements except Trendelenburg.		
3 Code 03 is displayed and a fast repeated audible warning is given from the base and the table will not move when any motion is selected.	One of the base cover pressure switches has operated.	Remove object from base cover.
4 Code 03 is displayed and a fast repeated audible warning is given from the base when the table is moving from the castor position to the brake position.	One of the base cover pressure switches has been operated. If the hand control button remains pressed when the condition occurs, the table will stop for two seconds, reverse its movement for 1.5 seconds and then stop.	Remove object from base cover.
5 Code 04 is displayed and Table will not move when Trend, reverse Trend, Break Up or Break Down buttons are pressed.	Tilt switch has operated.	Press opposite button, e.g. Reverse Trend instead of Trend or, Break Up instead of Break . Down.
6 Code 04 is displayed and Table movement stops when moving to Trend or Break Down positions.	Tilt switch has operated to limit movement of table top.	Press opposite button, e.g. Reverse Trend instead of Trend or Break Up instead of Break Down.

(Continued)

6. MAINTENANCE

TABLE 1 - FAULT DIAGNOSIS

Fault/Condition	Possible Cause	Remedy
7 Code 05 is displayed and an LED is illuminated (see below), the Table stops moving and there is a continuous audible warning given.	The applicable table motion has been used for more than 40 seconds (consider whether a button has been accidentally depressed and held down).	Switch the table 'off', using the table on/off switch, (Fig.1 item 18), and then switch back 'on'.
Button Pushed Trend (3 or 4) Break (5 or 6) Lat'l Tilt (7 or 8) Height (9 or 10) Castor (12) Auto level (11)	LED illum'd. Patient (L) - (1) Patient (R) - (2) Brake - (13) Height - (10) Castor - (12) Auto level - (11)	Engineer to check Hand control.
8 Code 06 is displayed and Table stops moving.	Table duty cycle has been exceeded (2 minutes on in 8 minutes).	Wait for sufficient time to allow duty cycle protection circuit to re-enable.
Note: With this condition, movement of the table top to the full Trendelenburg position (orange hand control button 3 Fig. 4) is still possible.		
9 Code 07 is displayed and Table stops moving, and there is a continuous audible warning given.	A hydraulic solenoid has gone open or short-circuit.	Engineer to identify and replace the faulty hydraulic solenoid.
10 Code 08 is displayed.	Height Up button is pressed when table is not on its feet.	Warnings will stop when Height Up button is released. Press Brake button (13) then Height up (9).
11 Code 09 is displayed.	Castor button is pressed with table above minimum height.	Warnings will stop when Castor button is released. Press Height Down button (10) until minimum height then Castor button (12).
12 Code 10 is displayed and footswitch cannot be selected by pressing 'footswitch' button (see Fig. 4 item 14) on the hand control.	Footswitch unit not connected.	Connect footswitch unit.

(Continued)

6. MAINTENANCE

TABLE 1 - FAULT DIAGNOSIS

Fault/Condition	Possible Cause	Remedy
13 Code 10 is displayed and footswitch LED flashes (see Fig. 4 item 14) and table stops moving,	The footswitch system has failed.	Re-select footswitch by pressing footswitch select button and re-try. If fault repeats, engineer to check connections and, if necessary, replace footswitch.
14 A single audible warning is given from the hand control and the table will not move	Height down button is pressed when table is already at minimum height.	Warnings will stop when appropriate hand control button is released.
15 Red emergency stop LED continuously illuminated accompanied by a continuous audible warning sound from the base and an intermittent warning sound from the hand control.	The 'emergency stop' button has been pressed	To reset 'emergency stop', switch table 'off' and then 'on' again.
16 Table will not move and main control board audible warning sounds.	The serial communication link between the main control board and the hand control has failed, e.g. because of a broken wire or the hand control becoming disconnected.	Reconnect hand control or engineer to locate and repair broken wire. Try different handset socket, if problem solved engineer to inspect faulty socket.
17 Table will not move.	End door (short trunk section end) is open.	Close door or operate door microswitch.

CIRCUIT DIAGRAM INDEX

Drawing No.	Title	Fig. No.	Page No.
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699569	Opto board	28	35
699497	Top-of-column solenoid board	29	36
699755	Pin connections	30	36
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699495	Top-of-column distribution board	32	37
699980	Battery charger distribution board	33	38
699819	RX500 Main control board	34	39
699364	RX500 System diagram	35	40

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1. Patient orientation button and green indicator.
2. Patient orientation button and green indicator.
3. Trendelenburg button (orange).
4. Reverse Trendelenburg button.
5. Break (Extension) button.
6. Break (Flexion) button.
7. Lateral tilt button.
8. Lateral tilt button.
9. Table raising button.
10. Table lowering button.
11. Return to pre-set (auto level) position button.
12. Castor button and yellow indicator.
13. Brake button and yellow indicator.
14. Footswitch control button and yellow indicator.
15. Display panel for two digit code .
16. Emergency stop button and red indicator.

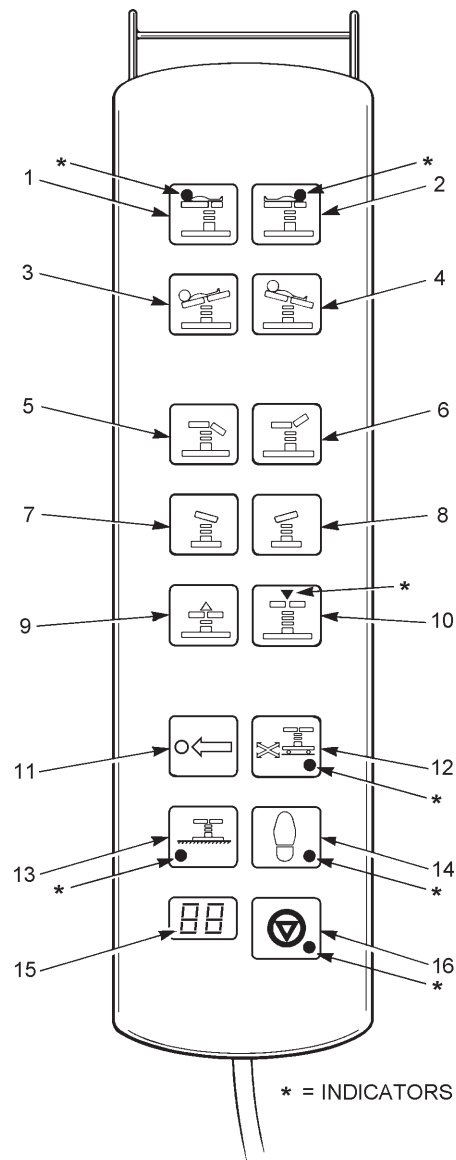


Fig. 27 Hand control functions

TABLE 2 : CODES FOR 2-DIGIT DISPLAY

CODE	CAUSE	REMEDY
01	Battery voltage low.	Recharge batteries as soon as possible.
02	Battery voltage critically low.	Recharge batteries immediately.
03	Base cover switch operated.	Remove pressure or weight from cover.
04	Maximum Break or Trendelenburg achieved.	Select reverse of function.
05	Button pressed for over 40 seconds.	Switch table 'off' then 'on' with switch 18.
06	Table duty cycle (2 min. in 8) exceeded.	Allow time for auto reset.
07	Hydraulic solenoid failure.	Call engineer.
08	Height Up button pressed with table on castors.	Brake table with button (13).
09	Castor button pressed with table raised.	Lower table fully with button (10).
10	Footswitch selected without Footswitch.	Connect footswitch.
10+LED	Footswitch system failure.	Retry and/or call engineer.

See Table 1 for more details of the codes and remedies.

6. MAINTENANCE

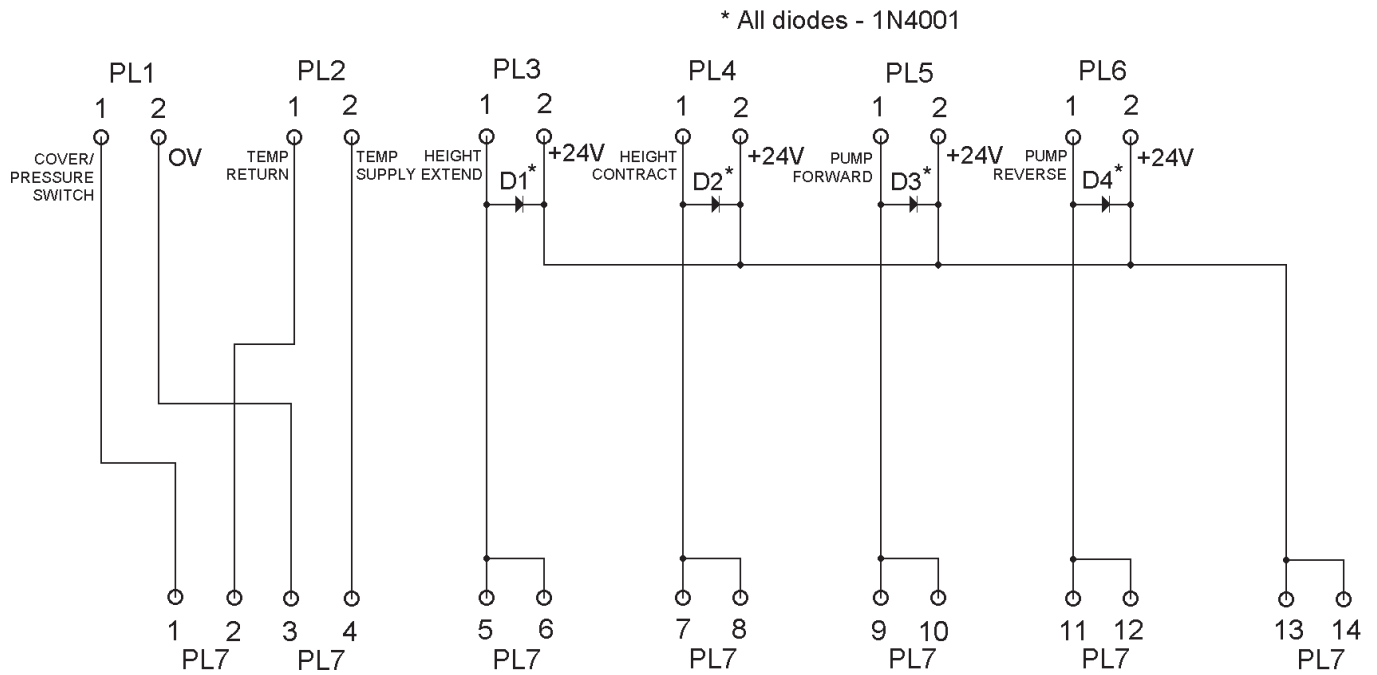


Fig. 28 Base Distribution Board

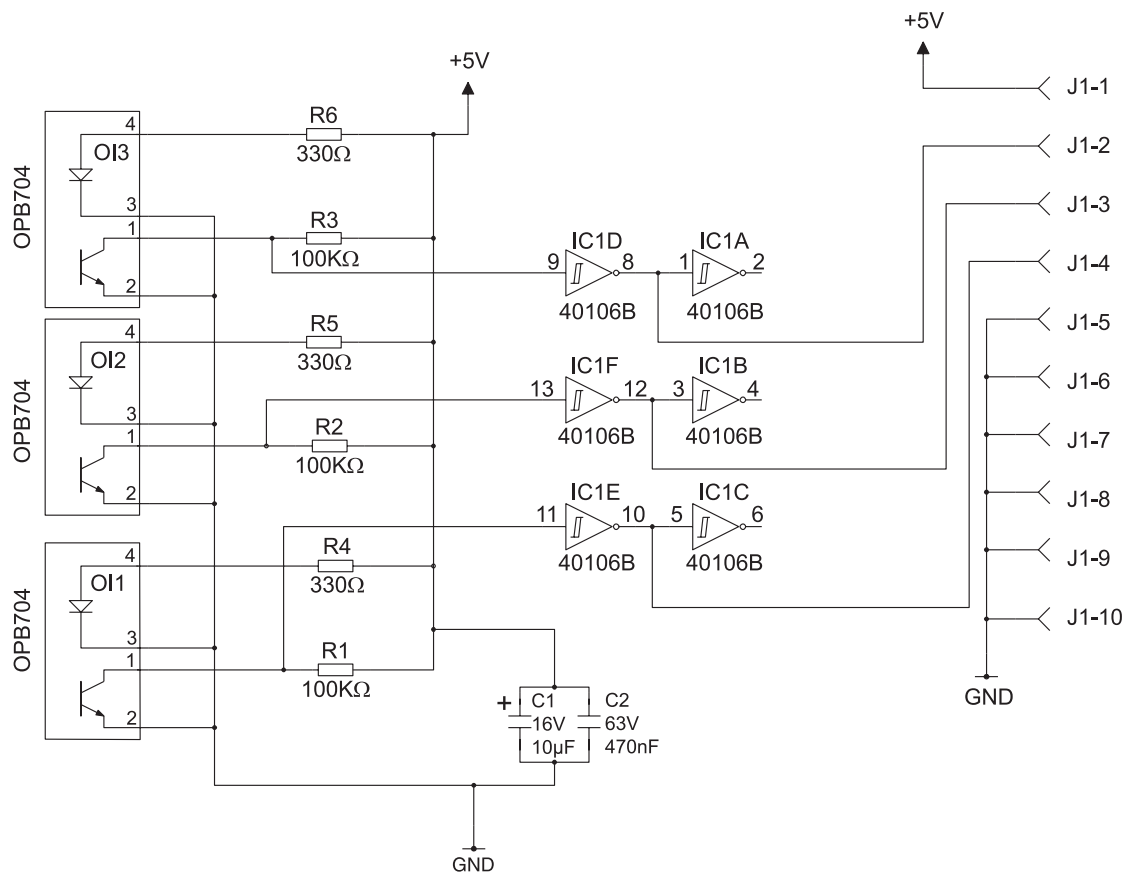


Fig. 29 Opto Board

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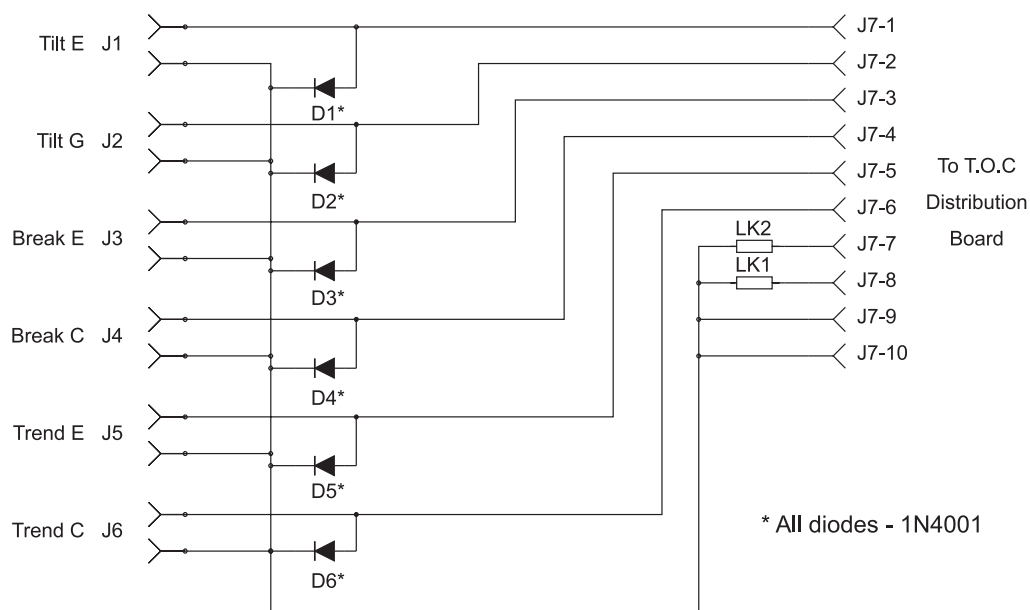


Fig. 30 Top-Of-Column Solenoid Board

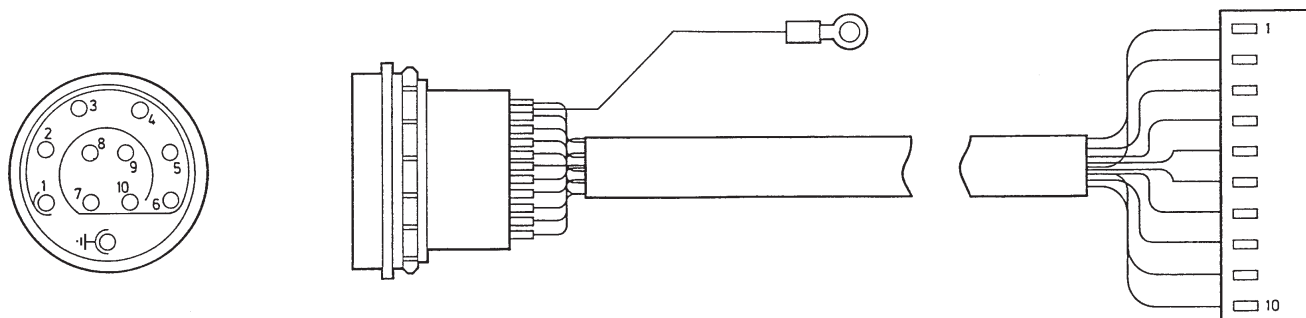


Fig. 31 Pin Connections

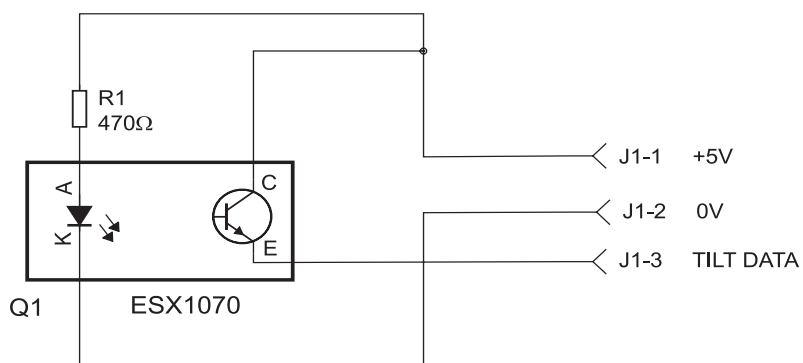


Fig. 32 Tilt opto board

6. MAINTENANCE

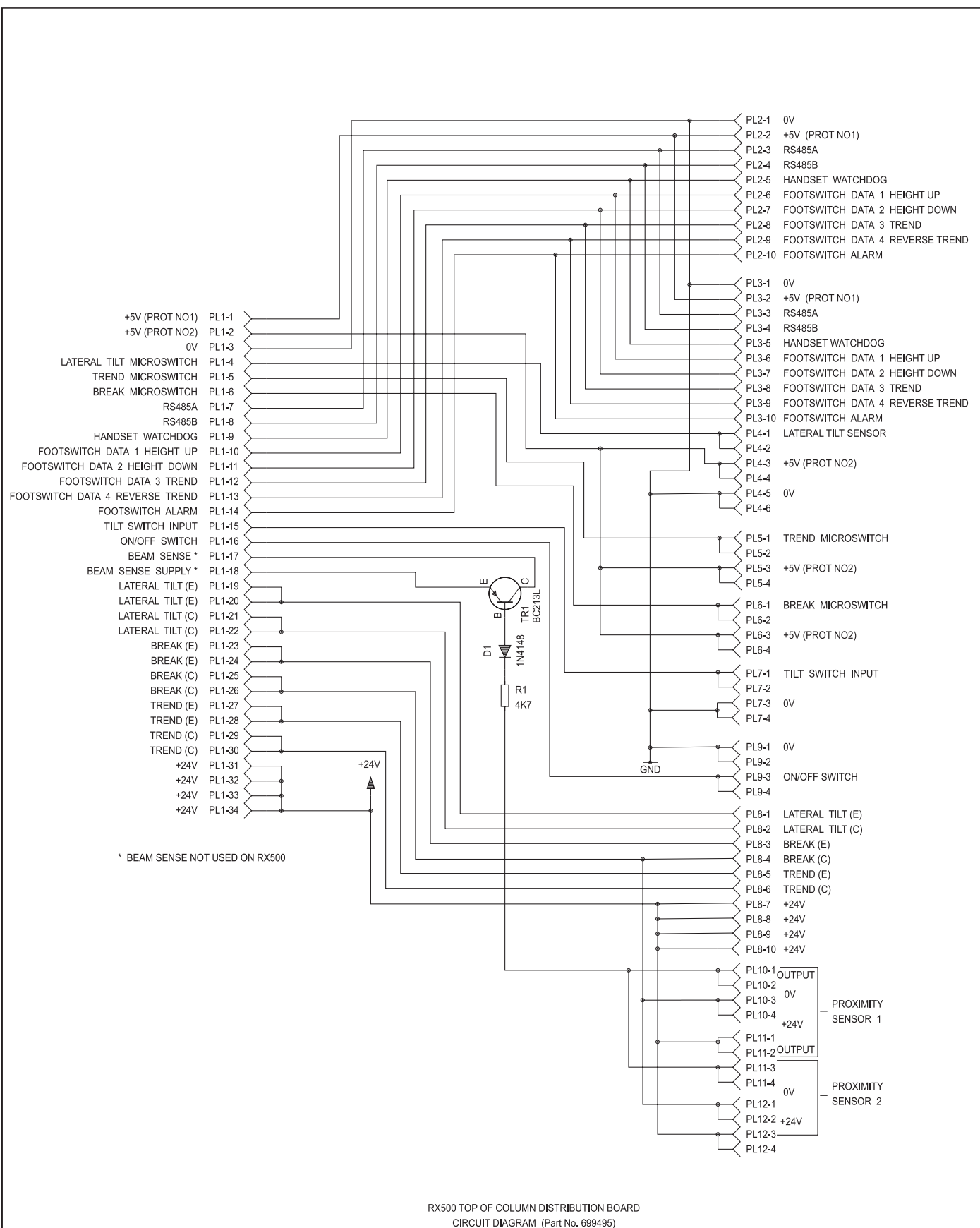


Fig. 33 Top-Of-Column Distribution Board

6. MAINTENANCE

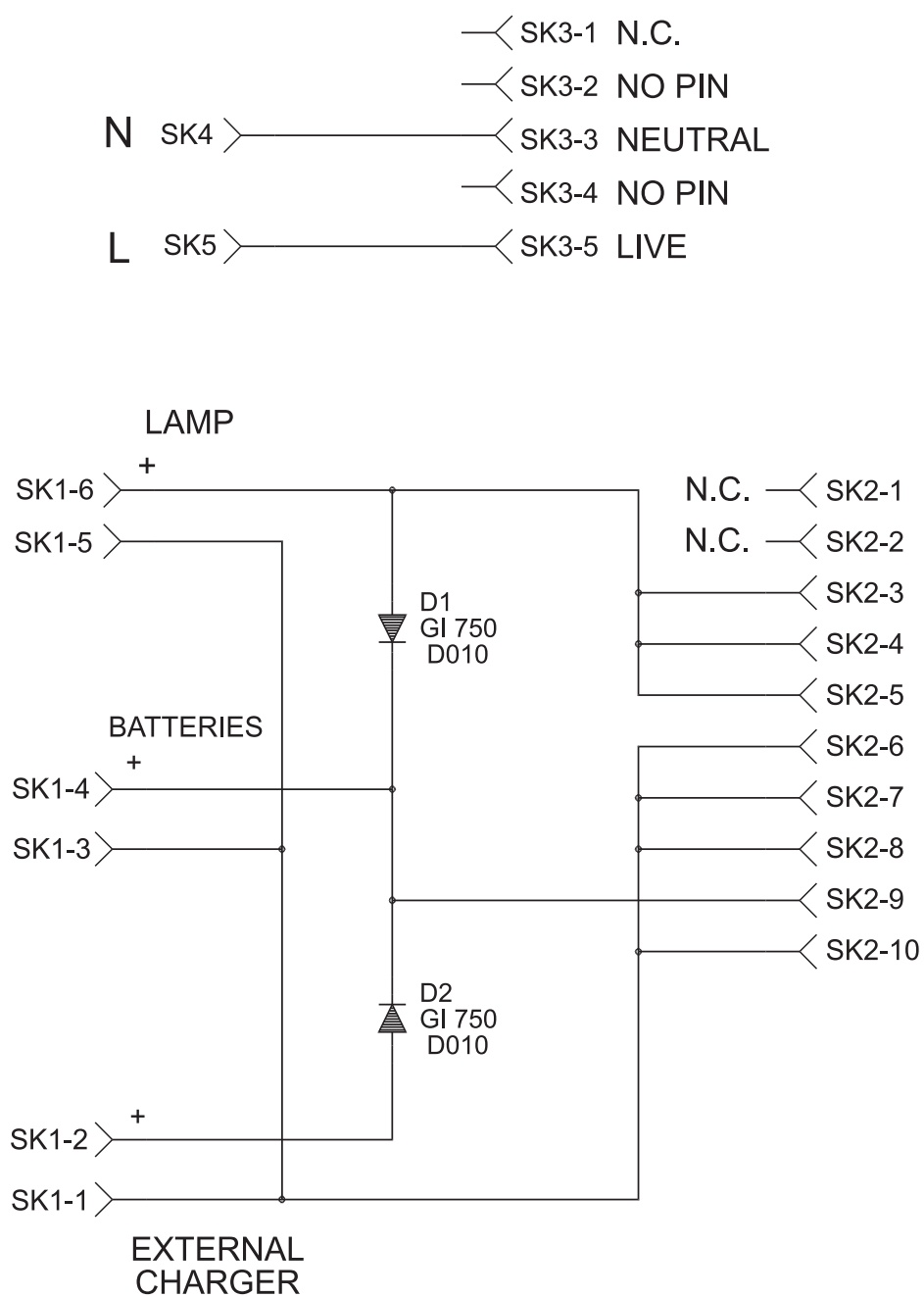


Fig. 34 Battery Charger Distribution Board

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